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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 1

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Thule

Major John B. MacWherter, USAF, IGY Thule Coordinator

Status Report for January 1959

Personnel. Major MacWherter and Captain de Zafra returned from temporary duty on 21 and 28 January, respectively. PFC Salberg completed his tour and returned to the continental U. S. SP-4 Douglas and PFC Trainer returned to Thule from T-3 after closing the C-2 recorder there.

Visitors. Colonel Paul E. Queneau, OCRD, USA.

Program.

Aurora and Airglow. Aurora were observed on only four days this month contrasted with ten in December. Overcasts prevailed on fourteen days. A three hour aurora occurred on 26 January.

A new spectrograph has been installed, improving film quality.

Photometer operation continues satisfactorily. Dr. Franklin E. Roach has written a paper on the results of the photometer operation here.

Radio Wave Absorption. Operation has been satisfactory.

24 January. Cosmic Ray Telescope. There were high counts on 1 and

Neutron Monitor. There have been no high counts.

Subaudio Geomagnetic Fluctuations. Operation for the month was normal.

Magnetic Variometer. The system is being realigned because of possible incorrect adjustments.

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National Oceanic and Atmospheric Administration

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Ionospheric Physics. Appearance of nighttime E layer was noted on 10, 11, 13 and 17 January. This appears as a regular E layer, rather than sporadic noted frequently. Normal E layer is beginning to appear around noon as daylight gradually returns. Aurora during 24-26 January caused considerable variation in the heights and critical frequencies of the F layer and pronounced retardation at the low end of the layer, along with unusual sporadic E layer appearances.

Seismology. An all-time high of 44 tremors was noted on the vertical recorder in January. Operation of the horizontal recorder has been discontinued. The vertical recorder will operate throughout the year.

Whistler Project. Operation of the Whistler project here has been discontinued because of negative results. High ambient electrical noise levels impede operation.

Adak, Alaska

Captain John F. Dickson, Jr., USA, Commanding Officer

Status Report for January 1959

General.

Weather conditions: Total snowfall for the month was 6.3 inches; total rainfall, 2.63 inches; average wind velocity, 11 knots, with maximum gusts of 51 knots on the 16th and 27th. Average temperature was 26.3 degrees.

Station Relocation. The technical equipment was moved from the Mitt Lake area to the new building in the Davis Lake Area during the period 26 through 28 January. The move was accomplished with a minimum of difficulty. High winds, rain, and snow hampered the installation of antennas for the Field Intensity equipment somewhat.

Ionospheric Physics. No disturbed periods occurred during the month. The daily maximum in the F layer critical frequency is slowly decreasing. Sporadic E echoes were not seen as often as is usual.

Satellite Monitoring. The monitoring of Sputnik III was discontinued on 15 January.

Ionosonde Antenna. The transmitting portion of the Delta Antenna has been increased to a 300-foot horizontal dimension. The change has resulted in an increase of noise at all frequencies, and a significant increase in echo response up to about 5 MC.

Station Bravo (T-3)
Scientific Leader, Oliver Wattenbarger (USWB)

Status Report for January 1959

Navigation and Island Drift. Position 1 January was 75° -20' North, 126° -22' West. Position 31 January was 74° -23° North, 128° -17' West. Drift was mostly in a west-southwest direction during the first third of the month, but it was almost entirely southerly during the latter part of the month. Total distance moved, 85 nautical miles; net distance, 65 nautical miles. Twenty-five celestial positions were taken during the month.

Meteorology. Average monthly temperature, 23.66°F; highest temperature in month, -7.06°F on 5, 24 and 25 January; lowest temperature in month, -54.94°F on 3 January. Average station pressure, 30.378 inches. Highest sea level pressure, 30.81 inches on 3 January; lowest sea level pressure, 29.78 inches on 30 January. Total precipitation, 0.01 inches. Total snowfall, 0.1 inches. Prevailing wind direction, north. Average wind speed, 10.4 knots. Fastest mile, 37 miles per hour from the northwest on 25 January. Percent possible sunshine, 0. Average sky cover, 0.3. Number days clear, 21; partly cloudy, 7; cloudy, 3. Number of days with precipitation 0.01 inch or more, 1. Number of days with precipitation 0.1 inch or more, 0. Number of days with visibility 1 mile or less, 6.

Gravity. Gravity readings continued on a twice daily basis, showing no unusual fluctuations.

Seismology. The seismic program has been continued in a routine manner. Ocean depths varied only slightly. Maximum depth was 1,315 feet, minimum, 1,205 feet.

Magnetics. Total field measurements continued on a daily schedule. Declination and dip measurements were resumed toward the end of the month after island rotation corrections again became available.

Oceanography. A new hydrographic hole was completed, and current and temperature profiles are now being obtained.

Glaciology. Shallow-depth thermocouples were read semi-weekly. Deeper temperature measurements show winter cooling effects have advanced to a depth of eight meters.

Biology. A polar bear that was molesting equipment and personnel at the hydrographic station was killed. Numerous fox tracks have been observed.

Scientific Personnel. Mr. Oliver Wattenbarger, Scientific Leader, and Mr. Paul Adams, meteorologists, U. S. Weather Bureau; Gerry Cabaniss, geologist, AFCRC; Mr. David Craven, mathematician (AFCRC Contract).

Mr. David Prentiss, geophysicist, (AFCRC Contract), left T-3 on 8 January 1959. SP-4 Douglass and PFC Trainer, U. S. Army ionospheric physics technicians, left T-3 on 11 January 1959.

Signal Corps operation on T-3 were terminated on 31 December 1958, after continuous operation throughout the IGY. Its several teams of personnel have provided assistance to other scientific groups on T-3, as well as furnishing technical maintenance, photographic assistance and move projectionists to the Island Commander.

USSR

Severnny Polyus-6

Severnny Polyus-6 is now drifting 330 kilometers from the geographic North Pole. The ice of the ice floe is about 10 meters thick, and the ocean depth is more than 4,000 meters. Information regarding the Central Arctic has been supplemented by many new data. For the first time in these latitudes, men equipped with diving suits have descended below the ice during the arctic winter. Recently, Viktor Gavrilovich Savin descended underwater to a depth of 20 meters. There he installed an automatic apparatus for investigating the subglacial layer of water.

Severnny Polyus-7 Ice Floe Splits

A 5-meter-wide crack has split the ice floe which carries the drift station Severnny Polyus-7 in the Arctic.

At the beginning of its drift, Severnny Polyus-7 was at 82°-04'N, 164°-50'W. The station is now in the Western Hemisphere at a point located at 86°-21'N, 96°-37'E [sic; probably should be W longitude], a little more than 400 kilometers from the North Pole.

The chief of the Station, Nikolay Belov, reports that the hydrologists' huts and the helicopter shed have been moved away from the edge into the interior portion of the ice floe. Contact is being made with the ionosphericists, who are now on the other half of the ice floe.

North Pole -11

A 16-man expedition is being arranged by the northern sea route administration to establish a new "North Pole-11" drifting scientific station in the Arctic to replace the "North Pole-6" station, the newspaper SOVIET RUSSIA reported on Mar. 19. The "North Pole-7" station is to be closed. The crew will leave behind a set of automatic instruments for transmitting weather reports. A new station, "North Pole-8," will be set up to the northeast of Wrangel Island, and an aircraft will leave for the Arctic in the middle of April.

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 2

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Thule

Major John B. MacWherter, USAF, IGY Thule Coordinator

Status Report for February 1959

Personnel. SP-5 Kaufmanis completed his tour and returned to the United States on 28 February.

Projects.

Aurora and Airglow. Aurora was observed visually but once this month on 11 February in conjunction with a magnetic storm. Nine nights were overcast. The all-sky camera recorded aurora on 18 and 21 February in addition to 11 February. Daylight and twilight now reduce observation hours considerably. The sun rose for the first time this year on 12 February. By 28 February only twelve hours of darkness were available for observing.

Operation of the airglow photometer has been satisfactory.

Radio Wave Absorption. Operation has been satisfactory.

Cosmic Ray Telescope. There was a high count on 11 February.

Neutron Monitor. No events.

Sub-audio Geomagnetic Fluctuations. Operation has been satisfactory.

Magnetic Variometer. The system was realigned during the month. Operation is now normal.

Ionospheric Physics. Several occurrences of night-time E layer have been noted and occurrences of polar spur. During the period 16-18 February, some very unusual traces were noted; scaling was difficult and

interpretation is incomplete. During this same period, which coincides with a magnetic storm, night-time E layer was noted along with sporadics. With the arrival of sunlight, some stratification of the F layer appears, but no definite F_oF₁ has been scaled to date.

Fixed Frequency Backscatter. Some echoes within the 500 km range were noted on 12 mc, with one echo on 18 mc at 500 km, and three or four on 30 mc at the 1500 km range. The 18 mc echo is the first noted at this station. Equipment troubles caused intermittent operation during the latter part of the month. The antenna froze in place during a storm which cost a day's operation.

Seismology. Another record month provided 97 tremors, some of them in the high magnitudes. Operation of the system has been normal.

Adak, Alaska

Captain John F. Dickson, Jr., USA, Commanding Officer

No report (will be incorporated in the March report, if received)

Station Bravo (T-3)

Scientific Leader, Oliver Wattenbarger (USWB)

Status Report for February 1959

Navigation and Island Drift. Position 1 February was 74 degrees 34 minutes North, 128 degrees 17 minutes West; on 28 February 74 degrees 05 minutes North, 128 degrees 20 minutes West. Overcast conditions limited the number of celestial fixed to 17. The Island moved a net distance of 18 nautical miles south, in a very erratic path.

Gravity. Gravity readings were taken on a twice daily basis, and show no unusual changes.

Seismology. Routine reflection seismic shots were continued throughout the month for the determination of ocean depths and sub-bottom characteristics. Water depths varied from 1275 feet in the middle of the month to 1155 feet at the end of the month.

Magnetics. Total field and declination measurements continued on a daily schedule.

Oceanography. Temperature profiles were taken to 1000 feet with a thermister apparatus. Instrumental difficulties were encountered toward the end of the month. Ocean current velocities have been below the range measureable with a dragmeter.

Glaciology. Measurements of ice temperatures with shallow and deep thermocouple cables continued on a routine basis.

Aurora. The all-sky camera was installed in a heated box away from the camp area. Operation has been complicated by jamming of the clock mechanism. The camera has been run almost continuously during the nights since 20 February.

Meteorology. Scheduled three and six hourly surface observations were taken. Sun reached an angle of 5 degrees on the 21st. Daylight season schedule was put into operation. The heights of the upper air soundings were increased. Both the upward facing and the downward facing Eppley pyrhemliometers and the Kipp solarimeters were put into operation. Net radiation and total hemispheric values were continuously recorded.

Average monthly temperature, -24.7 degrees F; highest temperature in month, -0.04 degrees F on the 17th; lowest temperature in month, -43.06 degrees F. Average station pressure, 29.80 inches. Highest sea level pressure, 30.345 inches on 1 February. Lowest sea level pressure, 29.375 inches on 28 February. Total precipitation, 0.11 inches. Prevailing wind direction, West. Average wind speed 7.8 knots. Fastest mile, 28 miles per hour from the south-southeast on the 28th. Total amount of sunshine 44 hours and 43 minutes. Average sky cover, 5.7. Number of days clear, 7; partly cloudy, 12, cloudy, 9. Number of days with precipitation 0.01 inches or more, 3; 0.1 or more, 0. Number of days with visibility 1 mile or less, 3.

No unusual meteorological phenomena observed during the month.

Scientific Personnel. Mr. Oliver Wattenbarger, Scientific Leader, and Mr. Paul Adams, meteorologists, U.S. Weather Bureau; Gerry Cabaniss, geologist, AFCRC; Mr. David Craven, mathematician (AFCRC Contract).

Harold Smith, meteorologist, U.S. Weather Bureau, arrived 22 February.

Mr. Oliver Wattenbarger and Mr. Paul Adams, U.S. Weather Bureau, departed 22 February.

ARCTIC RESEARCH LABORATORY
POINT BARROW, ALASKA
Operated By
University of Alaska
Under Contract
With
Office of Naval Research

PROGRESS REPORT FOR THE MONTH OF FEBRUARY, 1959

<u>ARL STAFF:</u>	Brewer, Max C.	Director
	Tietjen, Paul	Administrative Assistant
	Fischer, Robert	Pilot
	Harding, James	Storekeeper
	O'Sullivan, Kathleen	Secretary
	Stephens, Donald	Scientific Technician
	Talbert, Frank	Shop Foreman
	Agheak, Joseph	Native Workman
	Akpik, Frank	Native Workman
	Brower, Harry	Native Workman
	Lampe, Chester	Native Workman
	Sovalik, Pete	Native Workman
	Toovak, Kenneth	Equipment Operator

INVESTIGATORS AND ASSISTANTS:

Beal, M. Allan	Sea Valley and Tide Studies	Scripps Inst. Oceanography
Beal, Phyllis	Sea Valley and Tide Studies	Scripps Inst. Oceanography
Benggaard, Jans	Ionospheric Research	N.B.S.
*Church, Phil E.	Sea Ice Micrometeorology	University of Washington
Lyons, Laurence	Sea Ice Micrometeorology	University of Washington
Franzke, Arthur R.	Aurora & Earth Potential	Geophysical Inst., U. of A.
*Hicks, C. Norman	Heat Budget and Radiation Meas.	U.S. Navy Electronics Lab.
*Hussey, Keith	Geologic and Geomorphic Invest.	Iowa State College
O'Sullivan, John	Geologic and Geomorphic Invest.	Iowa State College
Meyer, Ardo	Magnetic Observatory	USC&GS
*Moser, Earl	Ice Construction Techniques	USNCEL
Coppedge, Grover	Ice Construction Techniques	USNCEL
Dykins, James	Ice Construction Techniques	USNCEL
Funai, Arnold	Ice Construction Techniques	USNCEL
Hansen, Robert	Ice Construction Techniques	USNCEL
Johnson, Dale	Ice Construction Techniques	USNCEL
Lair, Sox	Ice Construction Techniques	USNCEL
Schroeder, James	Ice Construction Techniques	USNCEL
Woodford, I. R.	Ice Construction Techniques	USNCEL
Petrie, Harry	Auroral Propagation Studies	N.B.S.
Workman, John	Auroral Propagation Studies	N.B.S.
Peyton, Harold	Structural & Mech. Prop. Of Ice	University of Alaska
Nathanson, Stephen	Structural & Mech. Prop. Of Ice	University of Alaska
Peyton, Patricia	Structural & Mech. Prop. Of Ice	University of Alaska
Saltsman, Hugh	NPR-4 Oil Field Inventory	U.S. Navy
Harding, Linda	NPR-4 Oil Field Inventory	U.S. Navy
Sole, Nelson	NPR-4 Oil Field Inventory	U.S. Navy
Sovalik, Phil	Arctic Ice and Permanfrost	U.S. Geologic Survey

*Not at ARL during the month.

ARRIVALS:

5 Feb.	Talbert, Frank	ARL Staff	Leave
7 Feb.	Peyton, Harold	Mech. Prop. of Ice	Leave
	Peyton, Patricia	Mech. Prop. of Ice	Leave
10 Feb.	Workman, John	Auroral Propagation	N.B.S.
12 Feb.	Fischer, Robert	ARL Staff	Helicopter Training
17 Feb.	Johnson, Dale	Ice Const. Techniques	USNCEL
	Woodford, I. R.	Ice Construction Techniques	USNCEL
19 Feb.	Meyer, Ardo	Magnetic Observatory	USC&GS
	Beal, Allan	Sea Valley & Tide Studies	Scripps Inst.
28 Feb.	Dykins, J. E.	Ice Construction Techniques	USNCEL
	Funai, Arnold	Ice Construction Techniques	USNCEL

DEPARTURES:

3 Feb.	Congdon, Renwick	Sea Valley & Tide Studies	Scripps Inst.
5 Feb.	Hansen, Robert	Ice Construction Techniques	USNCEL
	Beal, Allan	Sea Valley & Tide Studies	Scripps Inst.
10 Feb.	Meyer, Ardo	Magnetic Observatory	USC&GS
19 Feb.	Lair, N. A.	Ice Construction Techniques	USNCEL
26 Feb.	Crewer, Max C.	ARL Staff	Fairbanks Conferences
	Saltsman, Hugh	NPR-4 Oil Field Inventory	Fairbanks Conferences

Normal maintenance at the Laboratory this month included repainting the lounge in the upstairs of 251, refinishing the bar in the lounge, painting of woodwork in the upstairs hall of 251 and the wash room, painting of walls and ceiling in downstairs hall 251 and washing the woodwork there, and painting woodwork in the connection between 250 and 251. Additional book shelves were built in the lounge to take care of the growing library of books acquired for recreational reading.

ARL aircraft 5006E was mounted on ski wheels and aircraft 5004E on skis in preparation for the sea ice landings.

The interior layer of window sash was put in place in the greenhouse. A check on temperature shows that it will not be necessary to add a second layer of sash to the roof of the building. With only steam for heat, at -42°F outdoors, the inside temperature of the greenhouse at a height of 3 feet did not fall below 40°F . Additional heat, with controls for modulation, will be provided by a 20 kw bank of electric heaters.

A double cage was built for the two ARL female wolverines. Unfortunately, the one male wolverine which the Laboratory had kept since last July died of unknown causes. The new cage is built of 2" angle iron and 1-1/2" re-inforcing mesh and is designed so that the two sections can be opened to one another without entering either cage. The dimensions are: 20' long, 6' wide by 6' high.

Two wanigans were refitted by the staff. One is to be used by USNCEL personnel at their station 1/2 mile off shore. The other will be used at the Receiver Site by the N.B.S. Auroral Propagation project.

The old camping gear room in building 253 was removed to make additional vehicle warm storage space.

All of the piles for the temperature control lab room were cut to grade and the 5' snow cover in the area was removed using shovels and a D-4 bucket tractor. Foundation beams were set on pile caps and leveled in place. All lumber needed for the floor was set inside the building area in preparation for erecting wall and roof sections.

The Air Force contractor replaced the water tanks in family hut 6 and installed an electric stove there. Extensive work was done on ARL LVT, E-532, and the Laboratory D-8 Cat is being completely rebuilt.

Approximately 30 man days of direct assistance, including an equipment operator for the NCEL project, was provided to projects at the Laboratory by the shop staff.

The Director spent several days in Fairbanks discussing the re-establishment of an ice floe station north of Barrow. He also attended meetings outlining the proposed scientific program for the Cape Thompson area which is the site of the proposed AEC harbor project.

The monthly progress reports for February follow.

SEA VALLEY AND TIDE STUDIES:

"The first few days of February were spent in completing manuscripts.

On 5 February, the investigator departed ARL for conferences with colleagues at the Scripps Institution dealing with last winter's data and conclusions and the planning of the future observational program to come."

"On the return journey a day was spent in Seattle, Washington at the Vic Frank boat yard examining the research boat under construction for ARL."

"The investigator returned to ARL on 19 February and spent the remainder of the month in data processing and in planning the spring ice flying program."

(Beal)

IONOSPHERIC RESEARCH:

"The operations during February have been routine. Less than 1% of scheduled observations were lost from the Vertical Soundings."

(Bengaard)

SEA ICE MICROMETEOROLOGY:

"The general preparation of equipment for use in the project was continued."

"The Thornthwaite wind profile equipment was tested for operation under a variety of arctic winter conditions. Several series of readings were obtained from these tests."

(Lyons for Church)

AURORA & EARTH POTENTIAL:

"The Auroral Radar was operated throughout the month. Failure of a protective device in the radar transmitter caused some minor damage on the fifteenth. Five days records were lost before replacement parts could be received from College. A modification of the radar system was made on the twenty-sixth to produce a better record of echos from meteor trails."

"Operation of the Earth Potential recording equipment was continued throughout the month."

"The Riometer was in operation throughout the month."

"Operation of the All Sky Camera was continued throughout the month."

(Franzke)

HEAT BUDGET AND RADIATION MEASUREMENTS:

"Routine operation of the heat budget radiation equipment was carried out during the month. Considerable difficulty was experienced with one of the radiometers."

(Stephens for Hicks)

GEOLOGIC AND GEOMORPHIC INVESTIGATIONS:

"Mechanical analysis of the samples collected during the summer of 1958 was completed. Chemical and mechanical analysis was continued on those samples taken from auger holes in the permafrost. The major determinations being made on these samples are moisture content, percentage settlement, chlorinity, total hardness, calcium and magnesium content."

"Chemical analysis of the water samples obtained from 35 lakes in the vicinity of Barrow last fall is underway."

(O'Sullivan for Hussey)

MAGNETIC OBSERVATORY:

"The geomagnetic project at the Arctic Research Laboratory was continued during the month of February. Declination, Horizontal Intensity, and Vertical Intensity were determined through observations conducted weekly at the absolutes building near Barrow Village. An earth inductor was used to measure Vertical Intensity. Declination and Horizontal Intensity were measured with a Ruska magnetometer."

"Changes in the magnetic field were recorded photographically 24 hours a day for the month by the Insensitive and Rapid Run magnetographs. Three days records were lost on the Rapid Run magnetograph due to a mechanical breakdown."

"This investigator spent 9 days in Fairbanks consulting with the Observer in Charge, College Magnetic Observatory. The project work was carried on by the Arctic Research Laboratory staff during my absence."

"Processing of data and records was continued during the month."

(Meyer)

ICE CONSTRUCTION TECHNIQUES:

"The NCEL equipment arrived on 1 February. All equipment was assembled and checked by 5 February. Movement of equipment onto the ice approximately 3000 feet off shore from the Camp was accomplished on 6 February. Poor weather with temperatures reaching +30°F and frequent snow storms delayed construction of the ice dikes and initial flooding until 17 February. By the end of the month a depth of 18 inches was cast on the 300-foot diameter plot in 3-inch lifts. On the 100-foot square plots a depth of 14 inches in 7-inch lifts, 15 inches in 5-inch lifts and 18 inches in 3-inch lifts also was attained. Diking consisted of snow dikes, sprayed cheesecloth, and Visqueen. None are considered suitable for further development."

"Except for minor difficulties and modifications, all equipment performed satisfactorily although all equipment was not found to be entirely suitable."

(Schroeder for Moser)

AURORAL PROPAGATION STUDIES:

"An ARL wanigan was conditioned and moved to the receiver site. Power was

connected and oil tanks were placed for the space heater. Equipment was installed and calibrated. Receiver antennas were constructed and erected."

"Four wood poles were obtained from the NBS ionospheric station to be erected near building 355 for the transmitter antennas. Transmitter control units arrived and were installed."

"During this report period John Workman arrived to assume charge of the project at Barrow."

(Workman for N.B.S.)

STRUCTURAL AND MECHANICAL PROPERTIES OF ICE:

"Strain Gage Stations:

- 1) Station #1 in the fresh water lake has been put in operational order and appears to be functioning satisfactorily.
- 2) Stations #2 and #3 have been completed except for attachment of the terminal boxes which are being fabricated in the shop."

"Tri-axial Shear Studies:

- 1) Temperature controlled laboratory construction has progressed to the completion of the foundation and prefabrication of all structural panels. Erection of the panels is expected to be completed in the first week of March.
- 2) Temperature control equipment work proceeded with the testing and calibration of the environmental cell. This was completed as far as possible until the temperature controlled laboratory is completed.
- 3) The specimen freezing apparatus is under construction in the shop."

(Peyton)

NPR-4 OIL FIELD INVENTORY:

"The inventory of oil field equipment continued during the month with that for the Super-Titan Rig being completed."

"Considerable amounts of equipment were returned by the Air Force for disposal."

(CARL for Salteman)

ARCTIC ICE AND PERMAFROST:

"The regular schedule of geothermal measurements are continuing at Barrow, Fairbanks and Glennallen, Alaska. The readings at the latter installations were obtained by the Army Corps of Engineers and the Bureau of Public Roads. At Barrow, Phillip Sovalik joined the project on a W.A.E. basis. He will continue thermal observations at key installations and obtain supplementary field information needed in the interpretive studies. One of his first accomplishments was

the installation of a thermistor cable in the center of one of the plots where investigators from the Naval Civil Engineering Laboratory are conducting their flooding tests over sea ice. Readings are obtained daily at that installation."

"With the assistance of Bob Munroe, Gordon Greene has completed setting up a soils laboratory in the newly acquired Branch space at Menlo Park. The laboratory has been conducting seive and hydrometer analyses of permafrost samples on a routine basis since February 9."

"Calculations were completed for the report on the formation of ice wedge polygons in permafrost. Preparation of the manuscript is expected to begin in March."

"The manuscript 'Dissipation of the temperature effect of drilling a well in Arctic Alaska', U.S.G.S. Bulletin 1083__, was returned to Lachenbruch for a final check before going to GPO. This check has turned out to be time-consuming owing to divergence between the author and Survey editor on various points of mathematical presentation."

"Vaughn Marshall is conducting a review of the literature on the termal conductivity probe preparatory to working up the termal properties data obtained by the project."

(Brewer)

Max C. Brewer
Director
Arctic Research Laboratory

USSR

Arctic Exploration. Soviet polar explorers on drifting station North Pole 6 have discovered an underwater elevation 350 kilometer from the geographical pole. The station passed over the region February 15. The minimum depth was 730 meters, registered at a point 86 degrees 54 minutes north latitude and 61 degrees 40 minutes east longitude, approximately 560 kilometers north of Franz Josef land. The ocean depths on the path of the drift of the station have usually amounted to 3,000 to 4,500 meters.

Preparations for Spring. At the onset of spring, a high-latitude aerial expedition will leave from Moscow and Leningrad for the Arctic. In addition to conducting scientific research, the members of this expedition will replace the staffs at the drift stations Severnyy Polyus-6 and Severnyy Polyus-7. The polar workers who have spent a year at these stations will return home. The new staffs will continue the study of the Central Arctic Basin.

The members of the high latitude aerial expedition will continue the installation of radio beacons and automatic radiometeorological stations on drifting ice. These stations will help obtain important data for the preparation of weather forecasts for ships and planes.

Ships of the ice patrol will conduct oceanographic work and ice reconnaissance in the Laptev Sea, Kara Sea, East Siberian Sea, and Chukchee Sea. Regular ice reconnaissance will be carried out along the Northern Sea Route. One of the Polar Aviation airplanes is specially equipped as a "flying laboratory".

Information on weather and ice will be transmitted from the plane to the captains of icebreakers and transport ships.

Severnny Polyus-6. The circumference of the Severnny Polyus-6 ice island is more than 33 kilometers. The thickness of the ice island is 9-12 meters, or about the height of a three story house.

Scientists estimate that the ice island will continue to serve science for another 4 years, or even more, until such time as the sea currents and winds will carry it out into the Atlantic Ocean.

Severnny-Polyus-7. Twenty-eight polar scientists have worked at Severnny Polyus-7 for the past 8 months, ie., since 11 April 1958. Most of them are from Leningrad, associates of the Arctic and Antarctic Institute.

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 3

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THULE

Major John B. MacWherter, USAF, IGY Thule Coordinator

Status Report for March 1959

Personnel. SP-4 Smalser completed his tour. Lt. Smart went to AFCRC on temporary duty.

Visitors. Mr. Ray Egan, Stanford Research Institute.
Dr. W. R. Webber, University of Maryland.
Dr. Robert Mellen, USN Underwater Sound Laboratory.

Projects.

Aurora and Airglow. Aurorae were observed twice on 11 and 15 March. Only three nights were overcast. Due to continuous daylight and twilight here now, the visual observation program has been terminated. Operation of the airglow photometer terminated on 9 March, when the photometer was returned to Dr. Roach, NBS. He has informed us that the airglow results here are most significant and that another airglow program is contemplated for Thule next winter.

Radio Wave Absorption. Satisfactory operation except for intermittent reception of CW on the receiver's frequency.

Cosmic Ray Telescope. Dr. Webber calibrated and modified the telescope during his visit here. Normal operation for the month.

Neutron Monitor. No events.

Sub-audio Geomagnetic Fluctuations. Satisfactory operation.

Ionospheric Physics. Long daylight hours have brought out the appearance of F1 layer with clearly defined criticals, between 0800 and 1500 hours local time. "G" condition was noted on the 29th of the month.

Fixed Frequency Backscatter. Mr. Egan performed a complete overhaul of the unit, resulting in greatly increased performance. Upon completion of the work, consistent echoes were recorded on all three channels, both of the ground reflected type, and also of aurora and meteor types.

Seismology. Normal operation. Some 81 tremors of small to moderate degree were recorded.

Adak, Alaska

Captain John F. Dickson, Jr., USA, Commanding Officer

Status report for February and March 1959

General. Weather conditions: The total snowfall for February was 10.2 inches and for March 32.4 inches. Total rainfall for February was 6.04 inches, and for March 3.51 inches. Average wind velocity for February was 14 knots, while for March it was 16 knots. Maximum gusts for February was 60 knots and occurred on the 4th; for March 74 knots and occurred on the 31st. Average temperature for February was 35.5 degrees; for March 33.0 degrees.

Personnel Changes. SP-5 Francis J. Martin was promoted to that grade on 9 February. SP-4 Ronald L. Tommerdahl and SP-4 Jack B. Martin were promoted to that grade on 12 February.

Ionospheric Physics. Diurnal maximum foF2 is decreasing from the winter maximums. Night E layer was observed at 2200 hours on 22 February and from 0000 to 0100 on the 25th. During a disturbed period on 26-27 March the presence of E layer was observed continually at all hours. The E layer was divided into E1 and E2 at 1500 hours on 4 March.

Station Bravo (T-3)

Scientific Leader, David Craven, AFGRC

Status Report for March 1959

Navigation and Island Drift. The position of the Station on 1 March was 74 degrees 05 minutes North and 128 degrees 18 minutes West; on 31 March, 74 degrees 05 minutes North, 128 degrees 37 minutes West. Net movement for the month was 5 nautical miles, while the total movement was approximately 15 nautical miles. 22 celestial fixes were taken during the month.

Gravity. Gravity readings were taken twice daily. Little change in values was noted.

Seismology. Routine reflection seismic shots were continuous throughout the month. Water depths varied from 1175 feet to 1200 feet.

Magnetics. Total field and declination measurements continued on a daily schedule. A two degree increase in declination corresponded with a period in which there was an almost total radio blackout.

Oceanography. Several temperature profiles were taken with the Woods Hole thermistor apparatus. Freezing of the lower portions of the hydrographic hole has temporarily interrupted this program.

Glaciology. Measurements of ice temperatures with thermocouples continued in a routine manner.

Aurora. The all-sky camera was operated 29 nights during the month. The increasing durations of daylight and twilight reduced the period of operation to two hours by the end of March.

Biology. An exhausted tern was captured on the runway but died two days later. Polar bear tracks were seen around the dump and within fifty feet of the camp.

Meteorology. Scheduled 3 and 6 hourly surface observations were taken. 45 upper air soundings were taken with an average termination altitude of 14,000 feet. Both the upward facing and downward facing Eppley pyrheliometers and the Kipp solarimeters were in operation during daylight hours. Net radiation and total hemispheric values were continuously recorded. Normal incidence readings were started.

Average monthly temperature, -30.1 degrees F; highest temperature in month, -9.04 degrees F; lowest temperature in month, -54.04 degrees F. Highest sea level pressure 30.375 inches on the 24th. Lowest sea level pressure, 29.500 inches on the 1st. Average station pressure, 29.992 inches. Total precipitation, 0.09 inches. Total snowfall, 1.9 inches. Prevailing wind direction, Southwest. Average wind speed, 7.3 knots. Fastest mile, 21 miles per hour from the West-Southwest on the 15th. Percent possible sunshine, 62. Average sky cover, 3.0. Number of days clear, 20; partly cloudy, 8, cloudy, 3. Number of days with precipitation 0.01 inches or more, 3. 0.1 inches or more, 0. Number of days with visibility 1 mile or less, 0.

No unusual meteorological phenomena observed during the month.

Scientific Personnel. David A. Craven, mathematician, Station Scientific Leader; Mr. Harold Smith, meteorologist, USWB, and Mr. Gerry H. Cabaniss, geologist, AFCRC. There were no personnel changes during the month.

Reestablishment of Arctic Ocean Ice Floe Station "A"

USAF operations are in progress to reestablish the Arctic Ocean Ice Floe Station "A" in the general vicinity of 75 degrees North, 160 degrees, West. Initial landings have been made and it is anticipated that major logistics flights to establish the base will commence as soon as a suitable air strip has been completed approximately 7 May.

The USAF will provide all base facilities and support personnel for this program.

In general, the initial scientific program will include:

- Meteorology (including upper air) - USWB
- Radiation and Sea Ice - University of Washington
- Oceanography and Geophysics - Lamont

Arctic Research Laboratory, Point Barrow, Alaska

Progress Report for the Month of March 1959

ARL STAFF:

Brewer, Max C.	Director
Tietjen, Paul	Administrative Assistant
Fischer, Robert	Chief Pilot
Harding, James	Storekeeper
Main, Robert	Pilot
O'Sullivan, Kathleen	Secretary
Stephens, Donald (Part-time)	Scientific Technician
Talbert, Frank	Shop Foreman
Agheak, Joseph	Laborer
Akpik, Frank	Laborer
Brower, Harry	Carpenter
Lampe, Chester	Carpenter
Nayakik, Willie	Laborer
Sovalik, Pete	Guide - Custodian
Toovak, Kenneth	Equipment Operator

INVESTIGATORS AND ASSISTANTS:

Adams, Dr. Mel	Growth Rates of Ice Plates	AFCRC
Foley, Harold	Growth Rates of Ice Plates	AFCRC
French, David	Growth Rates of Ice Plates	AFCRC
Beal, M. Allan	Sea Valley and Tide Studies	Scripps Inst. Ocean.
Beal, Phyllis	Sea Valley and Tide Studies	Scripps Inst. Ocean.
Stephens, Donald	Sea Valley and Tide Studies	Scripps Inst. Ocean.
Bengaard, Hans	Ionospheric Research	N.B.S.
Simmons, Abe	Ionospheric Research	N.B.S.
*Church, Dr. Phil E.	Sea Ice Micrometeorology	University of Wash.
Bennington, Dr. Ken	Sea Ice Micrometeorology	University of Wash.
Businger, Dr. Yoest	Sea Ice Micrometeorology	University of Wash.
Lyons, Laurence	Sea Ice Micrometeorology	University of Wash.
Franzke, Arthur R.	Aurora & Earth Potential	Geophysical Inst. U. of A.
Baumgartner, Tom	Aurora & Earth Potential	Geophysical Inst. U. of A.
*Hicks, C. Norman	Heat Budget and Rad. Meas.	U.S.N. Electronics Lab.
*Hussey, Dr. Keith	Geol. and Geomorphic Invest.	Iowa State College
O'Sullivan, John	Geol. and Geomorphic Invest.	Iowa State College
Meyer, Ardo	Magnetic Observatory	USC&GS
*Moser, Earl	Ice Construction Techniques	USNCEL
Coppedge, Grover	Ice Construction Techniques	USNCEL
Dykins, James	Ice Construction Techniques	USNCEL
Funai, Arnold	Ice Construction Techniques	USNCEL
Hansen, Robert	Ice Construction Techniques	USNCEL
Johnson, Dale	Ice Construction Techniques	USNCEL
Schroeder, Jim	Ice Construction Techniques	USNCEL
Woodford, I. R.	Ice Construction Techniques	USNCEL
Petrie, Harry	Auroral Propagation Studies	N.B.S.
Workman, John	Auroral Propagation Studies	N.B.S.
Peyton, Harold	Struct. & Mech. Prop of Ice	University of Alaska
Nathanson, Stephen	Struct. & Mech. Prop of Ice	University of Alaska
Peyton, Patricia	Struct. & Mech. Prop of Ice	University of Alaska

Saltsman, Hugh	NPR-4	Oil Field Inventory	U.S. Navy
Harding, Linda	NPR-4	Oil Field Inventory	U.S. Navy
Sole, Nelson	NPR-4	Oil Field Inventory	U.S. Navy
Sovalik, Phil		Arctic Ice and Permafrost	U.S. Geologic Survey

*Not at ARL during the month.

ARRIVALS:

2 March	Quam, Dr. Louis	Office of Naval Research	Washington, D.C.
	Brewer, Max C.	DARL	Fairbanks Conferences
	Adams, Dr. Mel	Growth Rate of Ice Plat.	AFCRC
	Foley, Harold	Growth Rate of Ice Plat.	AFCRC
	French, David	Growth Rate of Ice Plat.	AFCRC
	Main, Robert	Staff	Fairbanks
14 March	Miller, Capt. A.S.	Director, NPR-4	Washington, D.C.
	Reed, Dr. John C.	U.S.G.S.	Washington, D.C.
	Nathanson, Stephen	Struct. & Mech.Prop Ice	Fairbanks
17 March	Bennington, Dr. Ken	Station Alpha II	University of Wash.
	Hansen, Robert	USNCEL	Port Hueneme, Calif.
21 March	Brewer, Max C.	DARL	Fairbanks (Ice-Skate)
	Businger, Dr. Yoest	Sea Ice Micrometeor.	University of Wash.
24 March	Johnston, Dr. James	Army Ball. Miss.Center	Huntsville, Ala.
25 March	Brewer, Max C.	DARL	Umiat Inventory
	Saltsman, Hugh	Custodian, NPR-4	Umiat Inventory
	Main, Robert	Staff	Umiat Inventory
28 March	Harding, James	Staff	Umiat Inventory
	Nayakik, Willie	Staff	Umiat Inventory
	Peyton, Harold	Struct.& Mech.Prop Ice	Fairbanks
	Beal, M. Allan	Sea Valley & Tide Stud.	Fairbanks (Ice Obs)
	Main, Robert	Staff	Fairbanks (Plane rpr)
	Fischer, Robert	Staff	Fairbanks (Ice Obs)
31 March	Collin, Arthur	Can. Dept Mines & Tech.	
		Services	Ottawa, Canada
	Baumgartner, Tom	Aurora & Earth Pot.	Geophysical Inst. U.ofA.

DEPARTURES:

5 March	Quam, Dr. Louis	Office of Naval Research	Washington, D.C.
	Schroeder, James	Ice Const. Techniques	USNCEL
	Coppedge, Grover	Ice Const. Techniques	USNCEL
	Petrie, Harry	Auroral Prop. Studies	N.B.S.
10 March	Nathanson, Stephen	Struct.& Mech.Prop. Ice	Leave
15 March	Miller, Capt. A.S.	Director, NPR-4	Washington, D.C.
	Reed, Dr. John C.	U.S.G.S.	Washington, D.C.
	Brewer, Max C.	DARL	Juneau, AEC meetings
24 March	Adams, Dr. Mel	Growth Rate Ice Plates	AFCRC
	Beal, M. Allan	Sea Valley & Tide Stud.	Fairbanks (Ice Obs)
	Fischer, Robert	Staff	Fairbanks (Ice Obs)
	Franzke, Robert	Aurora & Earth Pot.	Fairbanks
25 March	Brewer, Max C.	DARL	Umiat Inventory
	Saltsman, Hugh	Custodian, NPR-4	Umiat Inventory
	Main, Robert	Staff	Umiat Inventory
	Harding, James	Staff	Umiat Inventory
	Johnston, James	Army Ball. Miss. Center	Huntsville, Ala.
26 March	Brewer, Max. C.	DARL	Fairbanks (Ice Obs)

26 March	Peyton, Harold	Struct. & Mech.Prop Ice	University of Alaska
	Businger, Dr. Yoest	Sea Ice Micrometeor.	University of Wash.
	Foley, Harold	Growth Rate Ice Plates	AFCRC
	Main, Robert	Staff	Fairbanks (Plane rpr)
	Nayakik, Willie	Staff	Umiat Inventory
28 March	French, David	Growth Rate Ice Plates	AFCRC
30 March	Bennington, Dr. Ken	Station Alpha II	Anchorage
31 March	Sole, Nelson	NPR-4 Oil Field Invent.	Umiat Inventory
	Nayakik, Willie	Staff	Umiat Inventory

The wall and roof sections of the 26 x 36-foot temperature control lab which had been prefabricated in the Butler Building were erected with no difficulty. Using a D-7 crane, it took about three days to place the ten wall sections and four roof sections. The average outside temperature while this work was being done was -40 degrees F. A temporary sheeting was put between the walls and the ground and two Herman Nelson heaters were used to warm the inside of the building. The floor was constructed in-place in comparative comfort. It is double insulated with 3" fiberglass and has a double layer of vapor barrier. Once the floor was completed, 6 KW of electric heat were sufficient to keep the inside temperature well above freezing regardless of the outside temperature.

The mechanical overhaul of the ARL D-8 Cat was completed. The cat was cleaned and given two coats of paint. The cab for the cat was repaired and a sliding rear window installed in it.

Holes were drilled near building 355 for an antenna field for NBS radio project and five 70-foot poles were set in place. Samples were taken from the walls of the holes for analysis by John O'Sullivan. The drilling of holes for other projects has supplies him with many of his samples during the winter.

Two benches were built in building 355. Assistance was given to the project in moving some heavy pieces of electronic equipment into the building. Also, 600 feet of wooden conduit for housing the high voltage transmission lines was constructed in the shop.

One of the weasels received on the shiplift last year was taken out of storage, painted and put into use.

The meteorological and permafrost project equipment was cleaned out of building 351. The interior of the building is being remodeled for use as laboratory space for zoological projects during the summer season. The old camping gear room in building 253 was torn out. Several panels were built for Peyton's project. These will be used to mount temperature controls in the temperature control lab. A masonite floor was laid in labs 6 and 7 in building 251.

Two men were supplied as laborers for three weeks to the two projects working on ice construction techniques.

ARL property at Umiat was inventoried and ARL Umiat Building #1 partially prepared for summer use.

In spite of unusually cold weather during March, the ARL Cessnas flew Allan Beal and Donald Stephens out on the Arctic Sea Ice to make seven oceanographic stations. The greatest distance reached was 200 miles from shore. This work was interrupted late in the month when Beal, Brewer, and Fischer went to Fairbanks at the request of the Alaskan Air Command to fly as ice observers, hunting for the new ice floe station, on the Navy P2V planes based at Ladd. Beal and Fischer made two flights before returning to continue the oceanographic station work; Brewer made five flights before the end of the month. Several good floes were noted, most of them in the vicinity of 160 degrees West and between 73 degrees and 75.5 degrees North. Brewer continued flying into April.

The Director traveled to Juneau on 15 March to sit in on the AEC meetings held in connection with the proposed Cape Thompson Harbor Project. On his return, he stopped at Anchorage for conferences with Air Force personnel concerning the establishment of the new ice floe station. While there, the DARL agreed to providing the ARL Cessnas and pilots for the initial landings on the new floe station.

The Laboratory was pleased to welcome several of its most staunch backers in March. Dr. Louis O. Quam, Head, Geography, ONR visited ARL from 3 to 5 March to discuss the ice floe station and other future projects. Capt. A. S. Miller, Director, NPR-4, and Dr. John C. Reed, Staff Coordinator, U.S. Geological Survey visited ARL on 15 and 16 March in connection with the disposal of NPR-4 oil field property.

The monthly progress reports for March follow.

INVESTIGATION OF GROWTH RATES OF ICE PLATES FROM FREEZING SEA WATER

"By casting a pool of sea water onto a cold ice surface for a time, removing the excess water to allow the ice to cool off, and repeating the process, ice plates of lower salinity than sea water may be deposited. Excess water may be removed either by pushing it off with a large squeegee or letting the water drain off naturally. The two important variables in controlling the thickness of the plates are the water-on-time for ice formation and the water-off-time for cooling the ice, excluding, of course, the air temperature and wind velocity which can not be controlled."

"Several time cycles were investigated for the two techniques for water removal, squeegeeing and natural draining. For the squeegee technique a 4-minute-on, 16-minute-off cycle gave a maximum growth rate, 1/8" per cycle, 3" per 8 hour day. One minute was allowed for removing the excess water. Salinity of the ice thus formed was measured as 1.4%. For the natural draining technique a 4-minute-on, 26-minute-off cycle gave a maximum growth rate, 1/4" per cycle, 4" per 8 hours. About two minutes was required for water drainage. Salinity of this ice varied from 2.1 to 2.5%. Under any given on-off times, ice growth rate may be increased by low air temperatures, high wind velocity, and night operating periods."

"Temperature measurements of the original ice surface, that is the ice surface at the start of a series of cycles after the ice had been dormant for a period of not less than 4 hours, were made for both drainage methods. The ice heats up to a value, dependent on air temperature and wind velocity,

after a few cycles and remains very nearly constant. Ice below the original surface is heated to a depth not exceeding two feet."

(French for Adams)

SEA VALLEY AND TIDE STUDIES

"The Barrow tide station was given routine servicing during the month and the records are complete."

"The program of oceanographic observations in the ice pack was initiated on 4 March with ice reconnaissance flights to the west and north of Point Barrow. During the second week of March, air temperatures below minus 35 degrees Fahrenheit limited our flying program to two stations west of Barrow. During the third week of March, four stations were occupied."

"From the 24th to the 28th, the investigator was at Ladd AFB acting as ice observer for flights into the ice pack using Navy P2V aircraft. Serial station number 7 was occupied on 30 March. The month closed with high easterly winds which kept us grounded."

(Beal)

IONOSPHERIC RESEARCH

"The vertical ionosphere soundings project has been operated with a loss of approximately 3% of scheduled observations due to equipment malfunctioning and repairs."

"A change in work schedule has been in effect since March 23. The records are no longer reduced at this station, but are forwarded to Anchorage for scaling."

"The installations for project 8255, Meteor Propagation, are being readied. Target date for beginning of operation is May 1."

(Bengaard)

SEA ICE MICROMETEOROLOGY

"Dr. Yoest Businger arrived from Seattle with a shipment of instruments and other equipment to be used in the project. The fifty-foot instrument tower and the air sampling apparatus were partially assembled in preparation for the major part of the project. The instruments and recorders for the temperature, radiation and light penetration studies were prepared for operation."

"Wind profile measurements with the Thornthwaite equipment were continued."

"Dr. Ken Bennington arrived to conduct crystal studies on the sea ice."

(Lyons for Church)

SEA ICE PETROFABRICS - PRELIMINARY TO WORK ON ALPHA II

"Samples of deformed young sea ice near pressure ridges have been taken for crystallographic study. Additional cores for the same study will be taken from young sea ice adjacent to flooded test sites where plastic yielding seems to have taken place."

(Bennington for Church)

AURORA & EARTH POTENTIAL

"All equipment was operated through the twenty-second of the month without failure. At this time all equipment except the earth potential recorders was shut down. The investigator departed for Fairbanks on the twenty-fourth of the month.

(Franzke)

HEAT BUDGET AND RADIATION MEASUREMENTS

"Due to operational difficulties, the heat budget radiation equipment was inoperative during most of the month."

(Stephens for Hicks)

GEOLOGIC AND GEOMORPHIC INVESTIGATIONS

"The period of March was spent in chemical analysis of the auger samples. After moisture contents were run, the samples were resaturated with distilled water, and this water was then analyzed for Ca^{++} , Mg^{++} , Chloride and Alkalinity. Preliminary work was done on a method of analysis for SO_4^{--} in order to correct the Ca^{++} determinations for soluble $CaSO_4$ not originally in the soil solution."

"Six holes, of ten-foot depth, were drilled in a joint effort with the National Bureau of Standards for the location of their antenna poles. Samples were obtained from each, and analysis is in progress."

(O'Sullivan for Hussey)

MAGNETIC OBSERVATORY

"The geomagnetic project at the Arctic Research Laboratory was continued during the month of March. Declination, Horizontal Intensity, and Vertical Intensity were determined through observations conducted weekly at the absolute building near Barrow Village. An earth inductor was used to measure Vertical Intensity. Declination and Horizontal Intensity were measured with a Ruska magnetometer."

"Changes in the magnetic field were recorded photographically 24 hours a day for the month by the Insensitive and Rapid Run magnetographs."

"Approximately two days were spent in determining the distance the variations building is from the proposed Air Force Land withdrawal. The distance is approximately 300 feet, which is not sufficient to guarantee

protection for the geomagnetic installation. The Coast and Geodetic Survey requested that the boundary of the proposed land withdrawal be moved, so as to assure a distance of at least 500 feet from the geomagnetic installation."

"Processing of data and records was continued during the month."

(Meyer)

ICE CONSTRUCTION TECHNIQUES

"To further the development of techniques for increasing the load-carrying capability of sea ice platforms, the months of March and April (through 9 April) were spent constructing several plots of artificially thickened ice. The average increased thickness of seven plots was four feet, thus increasing the total depth of the ice to eight feet. A correlated effort was undertaken to study the effect of varying depth of flood vs thermal shock to the underlying ice, and the strength, salinity, and density of the ice produced. Strength studies included both compression and tensile tests. Upwards of three hundred samples of the flooded and natural ice were collected and analyzed. Also a daily recording of the thermal gradient through the ice sheet was taken on some plots. In addition several techniques of ice production not in the original program were tried. They included formation of ice by rotating sprinklers, spray nozzle, saturated snow ice and free flooding (uncontrolled water spread)."

"The equipment was evaluated for its suitability in fulfilling the requirements."

"No formal conclusions will be drawn until the data are analyzed. However, the general trend of the data indicates the areas that appear most promising. The technique of free flooding, while conducted on a limited scale this year, is believed to warrant further investigation as well as that of the sprinkler and spray methods."

"The test site was in a good location and would have been adequate to accommodate an operation of a much larger scale. The main phase of the flooding operation was conducted during a period of exceptionally ideal weather for the work. The effective support furnished by the staff and the facilities of the Arctic Research Laboratory contributed much to the successful conduct of the project."

(Dykins and Funai for Moser)

AURORAL PROPAGATION STUDIES, NBS PROJECTS 8769 and 8895

"Records have been taken for the better part of this month at the receiver site."

"Installation work continues at the transmitter site, building 355."

"Harry Petrie departed for NBS, Boulder, Colorado, on 5 March."

(Workman)

STRUCTURAL AND MECHANICAL PROPERTIES OF ICE

"Strain Gage Stations"

"Shop work was completed on the terminal boxes for Stations 2 and 3. No. 2 was placed in the shore fast ice in the vicinity of the camp area and No. 3 was placed in Elson lagoon. Initial load tests were made and strains were observed. Failure in the water-proofing of station components proved quite severe in both stations. At present, additional time is being allowed for the stations to freeze in place completely before evaluating the extent of the failure."

"Station No. 1 in the fresh water lake was loaded with a cat and wanigan during trial testing of the USNCEL wanigan. As expected, the load was not sufficient to produce readable strains. Further load testing will be done in April."

"Tri-axial Shear Studies."

"Construction of the temperature controlled laboratory progressed to completion of the floors. It is expected to have some equipment and controls installed during April."

"Construction was started on a rather complex temperature control panel for the environmental cells. The set-up should be completed and installed during April."

"Repair and modifications were started on a 'micro-max' controller for temperature control of walk-in freezer laboratories. The available instruments had been previously modified without benefit of circuit diagrams and were not usable with their existing ranges and sensitivities. Satisfactory results have not yet been achieved, but many of the problems have been solved."

"The ice specimen freezing apparatus has not yet been completed."

(Peyton)

NPR-4 OIL FIELD INVENTORY

"Considerable assistance was provided in arranging for the repair and supply of the Cat train being leased to Colorado Oil and Gas for the purpose of moving the Grandstand and Wolf Creek Oil Rigs to the Gubic Structure."

"The NPR-4 residual property at Umiat, Alaska was inventoried and a portion of it transferred to the Arctic Research Laboratory."

"Inventory of oil field property at Barrow continued. Also, considerable equipment was received from the Air Force for disposal."

(DARL for Saltsman)

ARCTIC ICE AND PERMAFROST

"The regular schedule of geothermal measurements are continuing at Barrow, Fairbanks, and Glennallen, Alaska. The readings at the latter installations were obtained by the Army Corps of Engineers and the Bureau of Public Roads. Under the direction of Max C. Brewer (WAE) Phillip Sovalik continued thermal observations at key installations to obtain supplementary information needed in the interpretive studies."

"Writing of the section on mechanics was started for the manuscript 'Ice wedge polygons in northern Alaska'. The rest of the manuscript has been completed in draft form."

"Temperatures were measured in two 1600-ft. wells near Crestline, California in the San Bernardino Mountains. Measurements were obtained to a depth of about 1500 feet in one well, but the other was obstructed at the 150-foot depth. This work was done in cooperation with Professor Francis Birch and the California State Division of water resources."

"At the request of BUDOCKS engineering personnel, Lachenbruch made another short trip to Squaw Valley to consult on thermal problems in snow preservation. Lachenbruch completed technical reviews of two manuscripts during the report period."

"Greene accompanied Mabey to San Joaquin, California where they made tiltmeter observations on the local deformation of the ground associated with production of a water well."

(Brewer)

Max C. Brewer
Director
Arctic Research Laboratory

FOREIGN ARCTIC REPORTS

Volcanic Activity in the Arctic

In June 1958, the drift station Severnyy Polyus-6 obtained interesting information on the Lomonosov range while drifting over it from the southeast to the northwest, between 80 51 and 83 10 N latitude. This was the fourth time that a drift station had crossed this submarine range. During these drifts, it was established that the principal chain of the Lomonosov range is crossed by many transverse breaks and canyons. As a result, relatively isolated peaks and hills have been discovered. Some of them, possibly, were formed in the aftermath of destruction of the range by glaciers and by water at the time when it was above sea level.

One of the most interesting discoveries was the finding of traces of volcanic activity in the Arctic. It appeared that several elevations were clearly of volcanic origin. This was established for the first time by the drift station Severnyy Polyus-3 in November 1954.

It is very likely that some of the earthquakes on the Lomonosov range, which are now being recorded by seismic stations operating at the Arctic

observatories on Ostrov Kheysa and Bukhta Tiksi, have a volcanic and not a tectonic character. However, tectonic earthquakes are no less likely to occur in this area. This is indicated by the numerous transverse breaks of the Lomonosov range -- an obvious sign of the so-called "block" (glybovoy) character of its surface. The vertical displacements of individual blocks in relation to each other cause earthquakes; when they occur at the bottom of the ocean, as in this case, the cause seaquakes.

One (if not several) of the epicenters of earthquakes recorded in the northern part of the Greenland Sea, at a point 79 24 N and 1 30 W, is undoubtedly of volcanic type. Quite recently, an expedition on the Ob' discovered a separate elevation in this area, with 2,065 meters of water above it. Even more important is the fact that within only 5 miles from this point, a volcanic mineral, basalt hornblende, was discovered in the top layer of the bottom soil, corresponding to the present-day silt deposits, as well as in another layer, deposited between 80,000 and 100,000 years ago. It is true that the crystals of this mineral are not numerous and they might have been carried here by ice. This might be assumed, especially since there are obvious traces of a former volcanic activity on Spitsbergen and near the coast of Greenland.

However, if this were so, then why were these crystals deposited only in one place, and, besides, in the layers of different geological periods, while not one of 50 other stations discovered this mineral in the bottom soil?

It seems more plausible to believe that the discovered minerals are the product of volcanic eruptions which took place somewhere in the immediate vicinity. Two other important facts support this theory. In the first place, the underwater eruption in the Greenland Sea, to the west of Spitsbergen, has been mentioned before in literature. In addition, one should keep in mind the seismic activity in this area. The seismic zone extends from the Atlantic Ocean across Iceland, the Jan Mayen Island, and the Greenland Sea into the Arctic Basin and farther on toward the mouth of the Lena River. As it is known, the seismic zones usually coincide with the volcanic zones.

Traces of volcanism in the Arctic Basin were found also on the other side of the Lomonosov range, on one of its parallel spurs. On the basis of data collected by US scientists, it was concluded that the elevations of the ocean bottom, between the parallels 85 15 and 86 15 N and the meridians 83 98 W are of volcanic origin.

To the southwest and west of these elevations, Soviet expeditions have discovered the same volcanic mineral as mentioned above, i.e., basalt hornblende, in the bottom soil. This mineral is also found on the other side of the basin, near the continental slope bordering the Chukchee Sea from the north.

Thus, the impression is gained that fairly active geological processes continue to develop in the earth's crust of the portion of the Arctic Basin bordering on the Pacific Ocean. This point of view radically changes the prevailing idea that the structure of the ocean bottom in this region has been relatively frozen in its geological development.

Upper Atmosphere, Radio Wave Propagation, Long Distance TV Transmission

Complex observations of the daily and irregular changes in the flow of cosmic rays are being conducted at Ostrov Kheysa. These observations, together with data to be obtained by Sputnik No. 3, should provide a great deal of information on the nature of the phenomena which are being studied, especially in connection with solar radio emission, auroras, and geomagnetic disturbances.

Automatic photography, used for the first time in observations of auroras, is of great scientific interest. The spectrum of auroras is photographed and recorded on a film on a 24-hour basis with the help of special instruments, the "S-180" camera and the "S-180s" spectral camera. Special radar installations are also used for observations conducted for the same purpose.

Similar research is conducted by the stations Severnyy Polyus-6 and Severnyy Polyus-7. Soviet explorers have obtained interesting data. On the basis of visual observations, they came to the conclusion that there are two zones of intensive auroras. The first of these zones was discovered as early as 1881. The second zone of high intensity and frequency of auroras was discovered recently.

Geophysicists assume that ionospheric disturbances must be intensified in both of these zones. As is known, the auroras and magnetic-ionospheric disturbances have a great effect on the propagation of radio waves. In passing through the field of magnetic-ionospheric disturbances, radio waves are absorbed to a considerable extent, which affects the quality of trans-Arctic radio communications.

The Soviet drift stations have been conducting interesting experiments. It was found that reception of television broadcasts is possible over a distance of 4,000 kilometers. However, these experimental receptions were possible only when the ionosphere, from which the radio waves are reflected at a height of not less than 2,500 kilometers, was calm. When even minor disturbances occurred, the reception was disrupted.

The collection of interesting material under the IGY program continues. It is obvious that, as the result of observations, many more hypotheses will be confirmed, and important conclusions will be drawn which have great significance both for theory and for practical purposes. The new and up to date equipment of Soviet scientists opens up wider possibilities for studying not only the nature of our planet, but also of the cosmos. Here lies the deeper meaning of the fruitful international cooperative of scientists, as represented by the IGY.

Oceanographic Study of Greenland Sea

An important part of the oceanographic study of the Arctic is the systematic research conducted by Soviet expeditions in the Greenland Sea, which began in 1956. At that time, an oceanographic expedition on the Ob' was working in this area. Later, in the fall and winter of 1957, when the IGY had already begun, this work was continued on the Lena, and in the spring of 1958, by an expedition on the Toros.

Thus, observations in this area are conducted all year. It is possible, therefore, to determine what changes take place from year to year in the ice and water regime of the Greenland Sea.

The water exchange between the Arctic and the Atlantic Oceans takes place mainly in the northern part of the Greenland Sea. The current flowing into the Arctic Ocean from the Atlantic brings warm water with it, while the surface current flowing into the Atlantic carries cold water and ice. The quantity of ice in the Arctic seas and, consequently, the navigation conditions depend on the changes in these two currents.

An exploration of the Greenland Sea, as well as of the entire Arctic Basin, is also important for the solution of another interesting problem of oceanography, i.e., the study of the relief of the oceanographic bottom of the Arctic Ocean and of its structure.

Data collected by drift stations on the morphology and geology of the bottom of the Arctic Basin are immediately sent to the Arctic and Antarctic Scientific Research Institute in Leningrad where they are processed and summarized.

These data have made it possible to draw up a new, detailed bathymetric chart of the Arctic Ocean. This chart sums up the results of studies of the bottom relief during the first year of international research.

It turned out that the bottom relief is much more complex and irregular than had been assumed heretofore. There are numerous high mountain ranges, individual mountains, and depressions on the bottom of the ocean which were little known until now. These mountains and depressions are distributed according to a definite pattern, which is also inherent in the above-water mountains surrounding the Arctic Ocean.

Thus, for example, the mountains along the shores of East Greenland, dating back to the Caledonian era, have been known for a long time. Clear indications of a similar relief have been traced to the northeast of Greenland, in the area of the Greenland Sea and the Arctic Basin.

In a similar manner, lines of deep breaks in the earth's crust were discovered at the bottom of the ocean. Two systems of breaks are known in the northeastern part of Greenland, on the Jan Mayen Island in the Greenland Sea, on Spitsbergen, and on Zemlya Frantsa Iosifa; one of the systems extends from northwest to southeast, and the other one is perpendicular to the first.

Two systems of underwater break lines can be traced in the same directions. One of the systems, in the form of frequent parallel curves, extends in a northwesterly direction in the Greenland Sea. The same structural lines are continued in the southeast, in the form of the western continental slope of the Barents Sea, and in the northwest, i.e., in the Arctic Basin, in the form of the continental slope of North Greenland. In this way, it was established that the continental land block of the Russian Platform, with its underwater continuation in the form of the continental shelf on the Barents Sea and the Spitsbergen archipelago in the northwest, is clearly separated from the Canada-Greenland land block.

These discoveries have caused radical changes in the views which prevailed until now regarding the structure of this region. According to previous information on the northern part of the Greenland Sea, it was assumed that a bank existed in the form of underwater isthmus connecting Greenland and Spitsbergen. If this rise, named after Nansen, actually exists, which should be further investigated, it is considerably deeper than had been assumed before. The Nansen Rise is narrower than had been believed and it extends not from west to east, but from north-northwest to south-southeast, crossing the 79th parallel near the zero meridian.

Diving Operations Under Arctic Ice

A group of scientific associates of the Moscow State University and of the Marine Hydrophysics Institute, Academy of Sciences USSR, has returned to Moscow from the drift station Severnyy Polyus-6. During a period of several months the scientists conducted research on the drift of ice and the temperature exchange in the central Arctic Basin.

A special set of measuring and registering instruments were prepared for this type of work. The installation of instruments under the ice was carried out by divers using lightweight diving equipment. This was the first time diving operations were performed in the Central Arctic. It should be noted that these were not professional divers but young specialists in geophysics.

Lengthy and detailed preparations preceded this work. The comprehensive training program included a study of the principles of using lightweight diving equipment, the main types of insulating devices operating on oxygen and air, the oxygen pump, and the air compressor.

In the fall of 1958, the whole group arrived by plane at Severnyy Polyus-6. The first experimental diving tests were made on New Year's Eve. A ladder was lowered into the test hole. A powerful underwater lamp illuminated the 3-meter shaft in the ice with a greenish-blue light. The water under the ice was over 4,000 meters deep.

The divers were clothed in warm underwear and a rubber diving suit. The air temperature at this time was minus 40 degrees Centigrade, while the water temperature was minus 1.8 degrees Centigrade.

After the experimental descents proved successful, regular diving operations were begun. To install the instruments, one had to descend 10-15 meters below the ice. All available lighting equipment was used to illuminate the working area. However, several meters below the opening of the shaft it was completely dark and the divers had to grope their way about.

The scientists are convinced that such underwater operations could be performed in any region of the USSR and that they should be used more widely in support of scientific research.

Activities of Drift Stations in Arctic

Last-minute preparations are in progress at the Arctic and Antarctic Institute in Leningrad for the high-latitude aerial expedition "Sever-11."

As in the spring of every year, meteorologists, oceanologists, and geophysicists are participating in this expedition.

As in previous years, the high-latitude aerial expedition will have two purposes: (1) replacement of the staffs of drift stations, and (2) physicoceanographic exploration of the little known regions of the Arctic Ocean.

The drift station Severnyy Polyus-6 is now located in the region between the North Pole and Zemlya Frantsa Iosifa, and is moving in the direction of the Greenland Sea. It is assumed that the ice island will be carried out into the sound between Greenland and Spitsbergen during the polar night of 1959-1960. By the spring of 1960, the drift station will be in the same area where the members of station Severnyy Polyus-1 were taken off their ice floe in February 1938.

The scientific staff will study the geophysical, oceanological, ice, and meteorological regimes of a scientifically important region of the Arctic, i.e., the area adjoined the Atlantic Ocean. The interaction between the cold Arctic Ocean and the warmer Atlantic Ocean is especially noticeable in this region. This is the area of the fastest-moving drifts.

The members of station Severnyy Polyus-7, who have courageously endured repeated break-ups of their ice floe during the past polar night, are completing their year of drift "on the other side" of the North Pole, about 400 kilometers from Ellesmere Land. This region is known for comparatively low speeds of drift.

At present, Severnyy Polyus-6 and Severnyy Polyus-7 are concentrating on the sector of the Arctic Ocean bordering on the Atlantic. They are no longer studying the natural processes in that part of the ocean belonging to the eastern section of the Northern Sea Route. Meanwhile, the aerometeorological and oceanological study of this zone, adjoining the Chuckchee Sea and East Siberian Sea, is essential for improving the quality of ice forecasts during the forthcoming Arctic navigation season. It has been decided, therefore, to discontinue operation of the station Severnyy Polyus-7 in April of this year. A new station, Severnyy Polyus-8, will be organized in its place. It will be established about 400-500 kilometers from Ostrov Vrangelya, in about the same location where Severnyy Polyus-2 started its drift in 1950.

Since April 1954, there have always been two drift stations operating continuously in the Arctic Ocean. The Soviet scientific research stations "Severnyy Polyus" have spent a total of 3,330 days drifting in the ice of the Arctic Ocean, and have traveled about 25,000 kilometers with the floating ice.

During the past 3 years alone, drift stations conducted over 21,000 meteorological observations, launched over 8,000 aerological radiosondes into the upper atmosphere, and took more than 3,000 ocean depth soundings. Automatic devices made about 100,000 registrations of the properties of ocean currents and took more than 40,000 measurements of the water temperature at various depths of the ocean.

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 400. NO.

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THULE

Major John B. MacWherter, USAF, IGY Thule Coordinator

Status Report for May 1959

Visitors. Dr. T. O. Jones, Antarctic Program Director, National Science Foundation

Projects.

Aurora and Airglow. Continuous sunlight here has caused suspension of this program until the fall. During the 1958-59 dark season, aurora were observed on twenty-one days here. Most were in the form of arcs or pulsating patches. No color was detected. In addition to the visual observations, data was continuously collected by all-sky camera and by spectrograph.

Airglow photometer operation continued from October until March, with interesting and significant results, which were published in a paper by Dr. Franklin E. Roach.

Radio Wave Absorption. A complete ionospheric absorption period occurred, beginning 11 May. The riometer dropped to zero reception between 0100 and 0900Z. Gradual recovery began 14 May and lasted for four days.

Cosmic Ray Telescope. The absorption period also affected the cosmic ray count. The count dropped 10% from 11/2000Z to 12/0600Z, remaining at that level for four days and then gradually recovering. Only minor pressure variations occurred during the period.

Neutron Monitor. No events.

Subaudio Geomagnetic Fluctuations. Normal operation.

Satellite Recordings. The blackout interrupted satellite reception from 11/0500Z until 15/0300Z. Infrequent faint signals were heard on 14 May.

Ionosphere Recordings. An extensive E region ionization from 1 to 20+ mc on 10 May was the forerunner of the absorption period. This "1" type sporadic appeared at approximately 100 km height. The f-mins have been generally in the 1.5 - 2.5 mc range, except immediately after the absorption period when it went to nearly 5 mc. FoF1 and FoF2 have been scaled consistently as daylight lasts for the twenty-four hour period.

Fixed Frequency Backscatter. Echoes have been few during the month although some have been seen close in on the 12 and 18 mc channels.

Seismology. Activity during the month was normal, with moderate to severe shocks recorded on 24, 26, and 29 May.

Adak, Alaska

Captain John F. Dickson, Jr., USA, Commanding Officer

Status Report for April and May 1959

General. Weather Conditions. Total snowfall for April was 5.4 inches and for May 0.8 inches. Total rainfall for April was 3.34 inches and for May 5.16 inches. Average wind velocity for April was 13 knots with maximum gusts of 68 knots on the 1st of April while for May the average wind velocity was 12 knots with maximum gusts of 34 knots on 6 May. The monthly average temperature for May was 40.5°F.

Personnel. During April SP5 Victor F. Chang, SP4's Ronald L. Tommerdahl and Paul R. Ciprich departed this station for subsequent separation from the service. PFC's Ronald W. Nuttycombe, Donald L. Truedson, and Edward B. Poirier arrived for duty. During May, MSgt Curtis F. Keirstead, Station Chief, was appointed to pay grade E-8, effective 28 April 1959. MSgt Keirstead and SP5 Francis J. Martin were awarded proficiency pay effective 2 May 1959.

Visitors. A total of 241 children with military and parent escorts visited the station 16 May, Armed Forces Day. Some inaccurate records resulted from knob turning by the group.

Projects. Information has been received that Fixed Frequency Backscatter Equipment is being shipped to this station to arrive during July 1959. An early operational target date has been established.

Ionospheric Physics. April - The F layer has very nearly approached the summer normal of forming into F1 and F2 layers, with relatively low values of critical frequencies being measured for the F2. Very high absorption was observed on two occasions at local noon, 5 April and 11 April.

May - The F layer has reached its annual summer trend and is dividing into F1 and F2 layers daily, with the daily maximum critical frequencies remaining below 10 megacycles.

Severe blackout (complete absorption) conditions occurred on the 8th and 10th, with the latter extending over 3 1/2 hours from 2115 UT to 0045 UT.

Occurrence of Sporadic E has been unusually high, with over 90% of ionograms showing Es.

The Field Intensity Equipment revealed rather high solar activity. A total of ninety-six (96) Short Wave Fades were noted on the three frequencies recorded, with a maximum of 12 occurring on 17 May.

Preparations for True Height scaling were completed during the month for ionogram scaling effective 1 June 1959.

Station Bravo (T-3)
Scientific Leader, David Craven, AFCRC

Status Report for April and May 1959

General. In April electromagnetic equipment for the measurement of island ice thickness was calibrated. Sonar and magnetic vector recording equipment was awaiting the moving of the main camp.

Personnel. In April the scientific personnel included Harold Smith, USWB meteorologist, Gerry Cabaniss, AFCRC geologist. The following scientists arrived during April: Dr. George V. Keller, Mr. Frank Frischknecht, Mr. Ronald D. Wahl, and Mr. Dallas B. Jackson, USGS geophysicist. Also arriving were Dr. R. H. Mellen, physicist, Mr. T. A. Reynolds, electronic scientist, Mr. E. G. Democh, electronic scientist and Mr. Elton P. Kelly from the Navy Underwater Sound Laboratory, and Mr. P. L. Adams, USWB meteorologist. Mr. D. A. Craven, AINA mathematician departed on April 21 after a six month stay at T-3. Mr. Kelly and Mr. Democh departed on April 24.

Personnel in May included: Dr. Robert Mellen, Scientific Leader, USNUSL; A. T. Reynolds, USNUSL, Mr. Ronald Wahl, and Mr. Dallas Jackson, USGS geophysicists; Mr. Paul Adams, USWB meteorologist. Dr. Kusunoki and Dr. Muguruma, geophysicists arrived May 6. Mr. Frederick Williams, USNUSL, Mr. William Schmidman, USWB, and Peter Larssen, AFCRC micro-meteorologist arrived on May 14. Dr. George Keller and Mr. Fred Frischknecht departed May 6. Harold Smith, USWB and Gerry Cabaniss, AFCRC geophysicists, departed May 14.

Projects.

Navigation and Drift. Station position on April 1 was 74°05'N, 123°22'W and on April 30 was 73°40'N, 129°30'W. Both solar and stellar fixes were taken during the latter half of the month of April. Drift was generally south westerly. The station position on May 31 was 72°42'N, 130°16'W. The number of solar fixes made was 8. Drift was approximately 45 miles, SSW, erratic.

Gravity. During April twice-daily observations were taken with a North America and a Worden gravity meter. The Worden meter was used to make ties with the Thule, Greenland station. In May daily readings were taken at the base and grid positions.

Magnetics. Component measurements started in May.

Seismology. In April a new high resolution seismograph was installed on the edge of Colby Bay and daily shots for bottom reflections were started on the 14th. Shooting began on a new refraction spread with 1200 foot geophone spacing begun on the 27th. Ocean depth ranged from 1200 feet to 3250 feet. Reflection and Refraction shots continued during May and ocean depth varied between 2300 and 6800 feet.

Glaciology. During April measurements of ice temperatures with thermocouples continued on schedule. The upper four feet of ice showed the effects of higher ambient temperatures and greater insolation. Fifteen hundred measurements of snow depths were made.

Underwater Sound. A Jamesway was set up in the Colby Bay area and equipment was installed during April. The equipment is now being checked out in preparation for propagation work in coordination with Alpha Two. In May the installation was completed and the propagation scheduled with Station Alpha continued until June 15. Ambient noise measurements were made and sounds from unidentified marine life recorded.

Oceanography. The equipment received during May was installed in the ionospheric trailer. A James-way hut was erected in the Colby Bay area and an ice hole prepared.

Meteorology. During April, 39 upper wind soundings were made, using 30 gram pilot balloons. The scheduled three and six hourly surface observations were taken. Recordings of total solar radiation and sky radiation on a horizontal surface were continued and measurements of solar radiation at normal incidence were made at specified times. The output of an illuminometer and two solarimeters arranged to measure snow and ice albedo were being recorded during daylight hours.

The average temperature was -26.1°C with a high of 11.1°C and a low of -39.4°C . The average station pressure was 30.064 inches and the highest sea level pressure was 30.600 inches on the 22nd, and the lowest 29.520 inches on the 3rd. Total precipitation 0 to 0.3 inches. Total snowfall 0.3 inches. Prevailing wind was from the east averaging wind speeds of 3.5 knots. Percent possible sunshine, 69; average sky cover 5.1; number of clear days 10; partly cloudy 11, cloudy 7. Number of days 0.01 inches or more precipitation, 2; 0.10 inches or more 0. Number days visibility one mile or less, 7.

In May fog and low ceilings limited the number of upper wind soundings. The net and hemispheric radiation were recorded continuously from an illuminometer and snow albedo pyheliometer. The snow replica program was continued.

The average May temperature was 9.6°F, with a high of 31.8° on May 31 and a low of -24.2 on May 2. The average pressure was 30.11 inches with a high sea level pressure of 30.66 inches on May 3 and a low of 29.58 inches on May 8. Total precipitation 0.06 inches; total snowfall 0.6 inches. The prevailing wind was from the north. The fastest wind speed was 7.0 knots and the fastest 20 mph from the WNW on the 31st. Per cent possible sunshine, 37; average sky cover 7.3; number days clear, 5; partly cloudy, 7; cloudy, 19. Number of days precipitation, 0. Number of days with visibility one mile or less, 13.

Micrometeorology. During May recording of solar radiation continued and an integrated program including radiation, temperature profile, wind profile and ablation was started. Radiation measurements will include studies of various types of surfaces during the melt season.

Radio Propagation. A radio blackout occurred during 11-16 May on all of the HF bands. No effect was noted on strength or direction of arrival of VLF signals. Strong noise bursts were noted on 50 MC before the blackout.

USSR Status Report - May 1959

Drift Station Severnyy Polyus-6. At present the drift speed of Severnyy Polyus-6 is somewhat faster than had been expected and the ice island is quickly approaching the sound between Greenland and Spitsbergen. During the fourth year of its drift, Severnyy Polyus-6 will enter the sound and will probably break up partially; however, it is expected that it will be possible to continue the work at the drift station even then. It is assumed that the station will cease to exist in February or March 1960, at which time the remains of the ice island will probably be carried out into the Atlantic Ocean.

The drift of Severnyy Polyus-6 will be longer than that of other stations and ships. Previously the station Severnyy Polyus-4 had the longest drift period, 1,109 days.

Three shifts of polar scientists have worked at Severnyy Polyus-6. The staff of the fourth shift, which will probably be the last one, is now getting ready to replace the third shift. During a 3-year period, many interesting and important studies were made on the ice floe, providing a valuable contribution to the study of the Arctic. ("On an Ice Island Across the Ocean"; Leningradskaya Pravda, 7 Mar 59)

According to a radiogram from S. T. Serlapov, chief of station Severnyy Polyus-6, this station was turned over to the new staff of polar workers on 12 April.

Drift Station Severnyy Polyus-7. The Arctic and Antarctic Institute in Leningrad received a radiogram on 13 April from N. A. Belov, chief of

Severnny Polyus-7, stating that the last group of polar workers had been evacuated from the drifting ice floe and had arrived on Ostrov Dikson.

In the next few days the staff members of Severnny Polyus-6 and Severnny Polyus-7 will fly to the mainland. ("To the Mainland"; Moscow, Sovetskaya Aviatsiya, 14 Apr 59)

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Arctic Status Report No. 5

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THULE

Mr. John Allen Jones, Scientific Thule Coordinator

June, July and August, 1959

Personnel

Major John B. MacWherter and his staff returned from Thule in June and are assigned to project work within the Ionospheric Physics Laboratory, Geophysics Research Directorate. On July 1, Mr. John Allen Jones was appointed Thule Scientific Coordinator and Senior Scientist in Charge.

On July 1, the Ionospheric Physics Laboratory established a contract with the American Geographical Society. Under the terms of the contract, the American Geographical Society will conduct ionospheric physics studies at Thule Air Base and other areas in the Arctic Region on auroral physics and its interrelation with cosmic rays, ionospheric characteristics, and geomagnetism. Three civilian scientists have been stationed at Thule to perform the above mentioned studies: John A. Jones, Senior Scientist in Charge, Charles Brush Sawyer and Thorwald Lauritzen.

Visitors

In June, Mr. Carl Dieter and Mr. Anthony Romano, both from the Ionospheric Physics Laboratory (studying satellites) were at the station.

During the period August 15-20, 1959, graduate students from the Cosmic Ray Department, California Institute of Technology, installed an antenna and receiver within the station.

Projects

Aurora and Airglow - Inoperative until fall

Radio Wave Absorption - Normal operation, no events

Cosmic Ray Telescope - There was some difficulty in operation during the period July 4 through July 11, 1959. Unreliable results were obtained and this matter was discussed with the University of Maryland. During the period July 12-19, 1959, it was noted that the low counting persisted. During the period July 20-26, 1959, it was noted that there was a variation in counting rate which may have been caused by a change in the cosmic ray activity.

Neutron Monitor - Normal operation, no events

Sub-Audio Geomagnetic Fluctuations - Normal operation, no events

Satellite Recordings - Normal operation, the only satellite broadcasting over polar regions was 1958 Delta II.

Ionosphere Recordings - No data available

Fixed Frequency Backscatter - No data available

Seismology - Unsuccessful operation

ADAK, ALASKA

Capt. John F. Dickson, Commanding Officer

June 1959

Personnel

There were no arrivals or departures during the month.

General

Weather Conditions. There was no snowfall during the month. Total rainfall was 3.80 inches, average wind velocity 10 knots with maximum gusts of 48 knots on June 10. Average temperature for the month was 43.4°F.

Ionospheric Physics

The F layer exhibited its normal summer time trend of dividing into F1 and F2 layers, with F2 critical frequencies very seldom going higher than 7 megacycles. Sporadic E activity is very high, 99% of the ionograms reveal strong returns of "c", "h", "l", and "f" types. One instance of "r" type sporadic E was observed.

July 1959

Personnel

Capt. Roland A. Merullo arrived July 18, 1959. SP5 Francis D. Ryan and Pvt. Walter D. Kolander arrived July 21, 1959.

Capt. John F. Dickson, Jr. departed July 25, 1959 for reassignment to Ft. Monmouth, New Jersey. SP5 Francis J. Martin departed July 29, 1959 for separation. SP4 Jack B. Martin departed July 23, 1959 for separation.

General

Weather conditions. There was no snowfall during the month. Total rainfall was 2.50 inches, average wind velocity 11 knots with maximum gusts of 59 knots on July 13. Average temperature for the month was 47.3°F.

Projects

Fixed Frequency Backscatter - Equipment for the program arrived. The antennawas in the process of being installed by the Public Works Department, U. S. Naval Station, Adak.

Ionospheric Physics - The F layer was still in its normal summer time trend of dividing into F1 and F2 layers, although towards the end of the month this was occurring over shorter periods of time during the day. Sporadic E activity continued high with all types normal for this area being observed. Unusual periods of complete absorption (blackout) occurred on July 9, from 0215Z to 0400Z, on July 13 from 0345Z to 0430Z, and on July 16 from 2130Z to 2330Z.

August 1959

Personnel

SP5 John A. Hudick reported for duty August 11, 1959. SP4 Ronald W. Nuttycombe, Edward B. Polrer, and Donald L. Truedson were promoted to that rank from PFC, August 25, 1959.

General

Weather Conditions. There was no snowfall during the month. Total rainfall was 4.45 inches, average wind velocity 15 knots with maximum gusts of 49 knots on August 20. Average temperature for the month was 51.8°F, with a maximum of 65°F on August 25 and a minimum of 41°F on August 28.

Projects

Fixed Frequency Backscatter - The equipment was put in position and is almost ready for operation. The antenna mast installation was completed.

Ionospheric Physics The F layer was beginning to show evidence of the approach of the fall and winter. Critical frequencies were increasing in their diurnal maximum and separation into F1 and F2 layers occurred only at infrequent intervals. Sporadic E activity continued to be rather high.

STATION CHARLIE

K. O. Bennington, Scientific Leader

August 1959

Part One

"The melt season continued into August but by the month's end there were about 6 inches of ice on most melt ponds. The floe ice as a whole is very porous. The core strikes water generally at sea level and cores drain and appear whitish. There is a band of about 5 inches of fairly dense ice at both top and bottom of the section, the intermediate zone being porous. Average runway ice thickness is 60 inches. Some deformation along the floe margins has been observed. Lenticular masses up to 5 yards wide and thirty yards long, which cracked during previous thrusting, have been plucked away. No new cracks appear to have developed however."

"Four air deliveries were made during the month. Mail by Ptarmigan on the fourth and eighteenth, supplies and equipment on the fourth by C-123, and mail, supplies and equipment on the 28th by C-124. The last delivery also included the Lamont winch."

Part Two

"Investigators: No Change."

Part Three

"U. S. Weather Bureau - The unit was completely operational the entire month of August. Upper air program was inconvenienced by no delivery of the Radome. Lower temperatures may cause upper air program to be curtailed. Additional monthly weather summary was sent separately by Wattenbarger."

"U.S.N. Underwater Sound Laboratory - Continued primary mission of long range transmission measurements with Station Bravo (T-3). It became necessary on August 29 to discontinue these measurements due to critical shortage of explosives on Charlie and to obtain additional explosives awaiting delivery from Ladd AFB."

"Five propagation runs covering 5 different tracks were conducted with the assistance of a U. S. Navy P2V airplane operating out of Alaska. Results obtained from Charlie were very satisfactory."

"Planned reflectivity measurements have to date been impossible due to rapid ice movements and subsequent low frequency produced by cable flutter. These measurements will be conducted as soon as practical. Primary contact with the icebreaker Staten Island indicates the possibility of her assistance in conducting propagation run for Charlie and Bravo during early September. Many broad-band reverberation and ambient recordings are being made concurrently with other work being conducted. Detailed narrow-band analysis of their recordings are planned upon return to the lab. Kelley"

"U.S.N. Hydrographic Office - In the relative ice motion studies, progress was continued with few difficulties being encountered. A total of 150 feet of film was exposed. For the study of ice surface phenomena a time lapse camera was set up at once, upon inception of the freeze, in order to record the effect on a melt pond. A total of four hundred feet of film were exposed on this project."

"Micro-divergence Study: A great deal of difficulty was encountered in attempting to keep the observation tower upright. As data collection was very limited, and the prospect of frequent lead-crossings in a rubber raft was quite uninviting, the project was abandoned. It will not be discussed in future monthly reports. Signed Gerson."

"Lamont - Program of sound prog. studies, by means of underwater explosions, continued through August. A program of seismic reflection and refraction observations, heretofore limited by lack of explosives, has been initiated and will continue while explosives are available. Vertical seismometer recorded ice movement of 10 seconds period continuously throughout the month."

"Submarine geological discipline hindered by lack of winch, however, using a D-6 tractor, ten bottom cores, the longest of which measured 100 inches, were obtained. Eight underwater camera stations yielded over 50 bottom photographs. Two successful biology trawls brought many animal specimens and a quantity of mud and rock."

"The precision depth recorder continued to record ocean depth and bottom configuration throughout the month."

"Microvariobarograph made continuous recording of atmosphere pressure variation, D, Z, H. Magnetometer operated continuously. Nuclear resonance magnetometer operated intermittently through August. Cromie."

"University of Washington

"Oceanography: Work proceeding satisfactorily. Monthly summary of sampling follows: 132 samples for chlorinity, oxygen, phosphate, and silicate; 70 bottom samples; 99 bathythermograph traces; water deepest since July 13. Present depth: August, Maximum 1780 meters. August, minimum 260 meters. Gast and Perry."

"Micrometeorology: The Weston recorder arrived safely by air drop on August 4 and was phased into operation. Recording of incident and reflected shortwave radiation was initiated using 2 Kipp solarimeters. The new radiation fields for air temperature thermo-couples were damaged in the air drop of August 23, however, they are being repaired and are replacing the old unit."

"Ablation of the upper surface of the flow ceased on August 14, except in areas of high contamination. Freezing of ponds has been almost continuous since August 14 and as the month closes the thickness of the pond ice averages nearly 13 centimeters. Draining of water from the flow as indicated by the water level recorder has practically ceased and shows a total rise in the flow for the summer of 37.6 centimeters. This agrees well with the tabulation measurements (from stakes) of 38.2 centimeters. It is to be pointed out that these measurements are from an area of small contamination. Hanson."

"Note: This report was garbled in transmission. It is not therefore a verbatim quotation -- Ed.

University of Washington
September 9, 1959

"The following report was received September 11 as Section Two to the Basic Report for August 1959. This was garbled in transmission and is not quoted verbatim."

"Upper surface started to freeze the last half of the month (August) but this is a slow process and the penetration of the freezing surface is not great. Measurement of the surface roughness was initiated: 24 sights were worked up and the line of the drift path for the month was estimated to be near 143 nautical miles. Three 100 foot rolls of photographic coverage were obtained for the radio sextant during the period August 3 to 8. These data will be processed later. Hanson and Sommerfield"

"Sea Ice Petrofabrics: Low temperatures have permitted thin-section and strength study to be resumed. To date no cores have shown satisfactory evidence for dating the ice in this floe, and good evidence for yearly growth has not been observed. Bennington."

"The fall relief for Station Charlie has been given as follows: Dr. Dan Hale, Dr. Charlie Knight, Don Makela and Austin Post. Dr. K. O. Bennington will continue as scientific leader until he departs. His current plans are to return for about a month in October. An oceanographer may be assigned to augment the detail." (Project Husky News, September 16, 1959)

BLUE GLACIER

"The project has been discontinued for the season. Ed LaChapelle is at the University on reduction and analysis of data. He will make periodic visits to the Station while working up data in order to keep the Glacier's state of health under observation." (Project Husky News, September 16, 1959)

INTERNATIONAL

USSR

Activities at Severnyy Polyus-8 Drift Station

Severnyy Polyus-8 is manned mostly by young Komsomols. This is the 3rd month of the station's drift in the Arctic Ocean. The scientific settlement was established about 1,000 kilometers northeast of Ostrov Vrangelya among the pack ice.

Several times a day, hydrologists measure the ocean depth, which ranges between 1,196 and 334 meters. These data will help to obtain more exact information on the continental slope of the Arctic Ocean.

Meteorologists and actinometrists, conduct round-the-clock observations of the air temperature and pressure, the wind speed and direction, and atmospheric phenomena. Twice a day, radiosondes are launched, carrying instruments up to 36-39 kilometers.

The scope of scientific work is increasing daily. Observation materials are regularly transmitted to the mainland, where they are used in the compilation of ice and weather forecasts.

Radio operators maintain constant radio contact with the mainland. They are also enthusiastic short-wave radio fans. Many radio amateurs are familiar with the call letters "Upol-8" of the station Severnyy Polyus-8. The station was happy to make contact with station Vostok in Antarctica. Despite the great distance, audibility was good.

During a 2-month period, the ice floe has traveled about 500 kilometers. ("Youth at the Pole," Moscow, Sovetskaya Rossiya, 5 Jul 59)

Arctic Summer Begins

The short Arctic summer has begun at the Soviet drift stations Severnyy Polyus-6 and Severnyy Polyus-8. Even at midnight, the sun does not disappear below the horizon.

Severnyy Polyus-6 is now drifting 320 kilometers north of Spitsbergen. The air temperature is often as high as 1-2 degrees above freezing point, and the snow is melting rapidly.

Severnyy Polyus-8 is drifting 780 kilometers north-northeast of Ostrov Vrangelya. In this region the weather is colder. The maximum air temperature has never yet been as high as one degree above freezing point.

The program of scientific observations at the stations is being fulfilled according to plan. All polar staff workers are in good health. ("Twenty-four hours of daylight," Moscow, Vodnyy Transport, 23 Jul 59)

Meteorological Rocket Launchings in the Arctic

Meteorological rockets for the study of the stratosphere are launched at regular intervals from Ostrov Kheysa, one of the islands of Zemlya Frantsa Iosifa. These rockets are smaller and less pretentious than those of the geophysicists. They carry no live passengers and cannot boast conquering outer space. Their tasks are simpler, i.e., they ascent to heights of 80-90 kilometers, transmitting information on air temperature and pressure on the way up, and in the upper stratosphere, they "shoot" their head section, filled with various instruments, back to Earth.

The flight continues for several minutes. During this period, the radio station of the rocket continuously transmits signals to the Earth, which are recorded on tape. The deciphering of these signals takes several hours. During its ascent, the rocket is heated by friction, which has an effect on the readings of all instruments.

The return flight is more complicated. During the first few kilometers, the parachute does not slow down the descent but only guides its direction; the air is so thin that the parachute is unable to open. Only at a height of 60 kilometers does the parachute begin to fill out, and the normal parachute drop begins. Almost an hour goes by before the head section of the rocket reaches the Earth.

One of the most interesting facts discovered during the past few years concerns the seasonal fluctuations in the "climate" of the stratosphere. It seems the stratosphere also has its winter and spring, summer and fall. Geographic and latitudinal differences have also been discovered in the distribution of temperature and pressure. The farther from the equator to the north and south, the more pronounced are these characteristics. This means that even at tremendous altitudes there is an equatorial zone, temperate zones, and polar zones. All this has an influence on the weather conditions close to the Earth.

Until recently it was believed that the intrusions of air masses (polar or tropical), cyclones and anticyclones, occur only in the troposphere, at relatively low altitudes above the Earth's surface. Now it is known that these phenomena occur in a much higher layer of the stratosphere and bring into motion huge masses of air. The continental character of the climate above the mainland, and the influence of oceans, reaches high altitudes.

Far from all the discoveries of scientists have been fully explained from the standpoint of physics. The whole process of the interrelations of air masses at high altitudes has not yet been clarified. The exploration of the stratosphere continues. ("Explorers of the Stratosphere," Moscow, Pravda, 31 Jul 59)

Polish Expedition to Spitsbergen

A Polish expedition departed from Gdynia for Spitsbergen on 3 June to conduct exploration in connection with the IGY. The expedition, consisting of 31 persons headed by Dr. Stanislaw Siedlecki, will explore the Koerber Glacier and the peaks of South Cape Island. ("Polish Expedition to Spitsbergen," Oslo, Friheten, 4 Jun 59)

C O P Y

ARCTIC RESEARCH LABORATORY
POINT BARROW, ALASKA
Operated By
University of Alaska
Under Contract
With
Office of Naval Research

C O P Y

PROGRESS REPORT FOR THE MONTH OF MAY 1959

ARL Staff:

Brewer, Max C.	Director
Tietjen, Paul	Administrative Assistant
Fischer, Robert	Chief Pilot
Franklet, George*	Field Assistant
Harding, James	Administrative Aide
Main, Robert	Pilot
O'Sullivan, Kathleen	Secretary
Stephens, Donald (Part-time)	Scientific Technician
Talbert, Frank	Shop Foreman
Thomas, Charles	Supply Specialist
Adams, Baxter*	Carpenter
Agheak, Joe	Laborer
Ahaglik, Roger*	Painter
Akpik, Frank	Laborer
Brower, Harry	Carpenter
Hopson, Edward	Carpenter
Itta, Harold*	Carpenter
Lampe, Chester	Carpenter
Solomon, Merle*	Custodian - Field Assistant
Sovalik, Pete	Guide - Custodian
Toovak, Kenneth	Equipment Operator
* Summer Employees	

INVESTIGATORS AND ASSISTANTS

Beal, M. Allan	Sea Valley & Tide Studies	Scripps Inst. Oceanography
Beal, Phyllis	Sea Valley & Tide Studies	Scripps Inst. Oceanography
Stephens, Donald	Sea Valley & Tide Studies	Scripps Inst. Oceanography
Bengaard, Hans	Ionospheric Research	NBS
Simmons, Abe	Ionospheric Research	NBS
*Church, Dr. Phil E.	Sea Ice Micrometeorology	Univ. of Washington
Bennington, Dr. Ken	Sea Ice Micrometeorology	Univ. of Washington
Ditzler, Robert	Sea Ice Micrometeorology	Univ. of Washington
Hansen, Arnold	Sea Ice Micrometeorology	Univ. of Washington
Lyons, Laurence	Sea Ice Micrometeorology	Univ. of Washington
Makela, Donald	Sea Ice Micrometeorology	Univ. of Washington
Post, Austin	Sea Ice Micrometeorology	Univ. of Washington
Thomas, Admiral C. W.	Sea Ice Micrometeorology	Univ. of Washington
*Elvey, Dr. Chris	Aurora and Earth Potential	Geophysical Inst.-U. A.
Baumgartner, Tom	Aurora and Earth Potential	Geophysical Inst.-U. A.
Holmes, Dr. G. W.	AFCRC Lake Peters Project	AFCRC, U.S. Geol. Survey
Barnes, David	Strength of Melting Ice Sheet	AFCRC, U.S. Geol. Survey
Leavitt, Frank	Strength of Melting Ice Sheet	AFCRC - AINA
Hobbie, John	Limnological Studies	AFCRC - AINA
Riddell, Frank	Lake Peters Camp Manager	AFCRC - AINA
Rock, Pvt. Carroll	Micromet Studies	AFCRC - AINA

*Hussey, Dr. Keith	Geologic & Geomorphic Invest.	Iowa State College
O'Sullivan, John	Geologic & Geomorphic Invest.	Iowa State College
Lewis, Charles	Geologic Mapping	AFCRC, U.S. Geol. Survey
Chase, Livingston	Geologic Mapping	AFCRC, U.S. Geol. Survey
Spetzman, Lloyd	Botanical Survey	AFCRC, U.S. Geol. Survey
Maher, William	Ecology of Jaegers	Univ. of California
Meyer, Ardo	Magnetic Observatory	USC & GS
Myres, Timothy	Behavior of Eider Ducks	U. of Brit. Columbia
Daniels, Mike	Behavior of Eider Ducks	U. of Brit. Columbia
Petrie, Harry	Auroral Propagation Studies	NBS
Workman, John	Auroral Propagation Studies	NBS
Peyton, Harold	Structural & Mech. Prop. of Ice	Univ. of Alaska
Nathanson, Stephen	Structural & Mech. Prop. of Ice	Univ. of Alaska
Payton, Patricia	Structural & Mech. Prop. of Ice	Univ. of Alaska
*Pitelka, Dr. Frank.A.	Ecology of Lemmings	Univ. of California
Cade, Dr. Thomas	Ecology of Lemmings	Univ. of California
Saltsman, Hugh	NPR - 4 Oil Field Inventory	U. S. Navy
Harding, Linda	NPR - 4 Oil Field Inventory	U. S. Navy
Sole, Nelson	NPR - 4 Oil Field Inventory	U. S. Navy
Sater, John	Sea Ice Photography	AINA
Sovalik, Phil	Arctic Ice and Permafrost	U. S. Geological Survey
*Vogelsang, Jerry	Polar Bear Census	Alaska Cooperative Wild- life Research Unit
*Not at ARL during the month.		

ARRIVALS:

27 April	Holmes, Dr. G. W.	AFCRC Lake Peters Project	To Lake Peters
	Leavitt, Frank	Strength of Melting Ice Sheet	To Lake Peters
	Riddell, Frank	Lake Peters Camp Manager	To Lake Peters
	Rock, Pvt. Carroll	Micromet Studies	To Lake Peters
29 April	Hobbie, John	Limnological Studies	To Lake Peters
1 May	Bennington, Dr. Ken	Scientific Leader	Station Charlie
6 May	Saltsman, Hugh	Caretaker, NPR-4	Fairbanks, Alaska
8 May	Thomas, Admiral C. W.	Project Husky	Univ. of Washington
	Hansen, Arnold	Micromet, Station Charlie	Univ. of Washington
9 May	Barnes, David	Strength of Melting Ice Sheet	At Lake Peters
	Post, Austin	Sea Ice Micrometeorology	Univ. of Washington
14 May	Cade, Dr. Thomas	Ecology of Lemmings	Univ. of California
	Maher, William	Ecology of Jaegers	Univ. of California
16 May	Franklet, George	ARL Staff (new hire)	Fairbanks, Alaska
20 May	Tietjen, Paul H.	ARL Staff	Seattle, Wash.
	Toovak, Kenneth	ARL Staff	Seattle, Wash.
21 May	Myres, Timothy	Behavior of Eider Ducks	U. of B. C.
	Daniels, Mike	Behavior of Eider Ducks	U. of B. C.
23 May	Tietjen, Paul H.	ARL Staff	Hula Hula River
28 May	Chase, Livingston	Geologic Mapping	USGS, Washington, D.C.
	Lewis, Charles	Geologic Mapping	USGS, Washington, D.C.
	Spetzman, Lloyd	Botanical Survey	USGS, Washington, D.C.
29 May	Cade, Dr. Thomas	Ecology of Lemmings	Pitmegea River
	Maher, William	Ecology of Jaegers	Pitmegea River
30 May	Hodges, James	AFCRC Radio Project	Stanford Res. Inst.
	Merritt, Robert	ARL Radio Consultant	Univ. of Alaska
	Shoup, Richard	ARL Radio Consultant	Univ. of Alaska

DEPARTURES:

2 May	Lyons, Laurence	Micromet Project	Univ. of Washington
7 May	Tietjen, Paul H	ARL Staff	Seattle (Boat Trials)
	Toovak, Kenneth	ARL Staff	Seattle (Boat Trials)
9 May	Bennington, Dr. Ken	Station Charlie	Fairbanks, Alaska
10 May	Holmes, Dr. G. W.	Scientific Leader, Lake Peters	USGS, Washington, D.C.
12 May	Thomas, Admiral C. W.	Project Husky	Univ. of Washington
14 May	Hansen, Arnold	Micromet, Project Husky	Station Charlie
20 May	Cade, Dr. Thomas	Ecology of Lemmings	Pitmegea River
	Maher, William	Ecology of Jaegers	Pitmegea River
23 May	Saltsman, Hugh	Caretaker, NPR-4	Fairbanks, Alaska
	Tietjen, Paul H	ARL Staff	Hula Hula River
	Ditzler, Robert	Micromet Project	Station Charlie
28 May	Chase, Livingston	Geologic Mapping	Lake Peters
	Lewis, Charles	Geologic Mapping	Lake Peters
	Spetzman, Lloyd	Botanical Survey	Lake Peters
30 May	Main, Robert	ARL Staff	Lake Peters
31 May	Brower, Harry	ARL Staff	Lake Peters
	Daniels, Mike	Behavior of Eider Ducks	Inaru River
	Myres, Timothy	Behavior of Eider Ducks	Inaru River
	Sovalik, Pete	ARL Staff	Inaru River

During May efforts were intensified to finish preparations for the coming field season, to complete the construction of the cold laboratory, and to advance the completion of the electrical work in several of the ARL buildings. Field supplies were obtained, 50 new summer parkas were cut down and provided with ruffs, and the canvas river boats repaired.

The interior of the cold temperature laboratory and the enclosed reefers were painted and a masonite floor laid. The laboratory is essentially complete and is now ready for use although it will eventually need additional refrigeration units installed.

Five electricians worked full-time for the complete month rewiring the connecting unit between ARL buildings 250 and 251, initiating work in building 253, and establishing complete new electrical service to the main ARL buildings.

A wanigan was completely renovated for the use of the micrometeorological project at Eluitkak Pass. This included a new floor, new stove, benches as desired by the investigators, and interior painting. The wanigan was then moved to the Pass, about 5 miles from the Laboratory. Holes were augered for the dead-men used to guy the micromet tower and to place the pole on which the boom reaching out over the water is to be mounted.

Twenty-six five-foot holes were augered for the poles supporting the ground planes for the new NBS project. Five additional 20-foot holes were augered for the Hussey project and several for the poles supporting the new electrical services to the Laboratory. Samples were obtained from all the holes, including three short distances out on the Fresh Lake, by O'Sullivan.

One new weasel cab was built and three weasels and one jeep were painted. ARL is beginning the summer season with new motors in four weasels and two new weasels included in the motor pool.

A new floor was built in the machine shop portion of the Butler Building and floor tile and formica laid in the new darkrooms. Remodeling work, including all new plumbing, was started in family unit No. 1.

The program of flying over and landing on sea ice was brought to a close at the end of the month. The program had a very successful season as oceanographic stations were made as far as 270 miles from shore and extended from 169°W to 137°W. This work was accomplished in spite of starting a month late, interrupting the program to assist in the establishment of the ice floe station, and three weeks of bad weather in May. Approximately 244 hours were flown by the ARL planes in support of the program. The three greatest needs for successful work in this field are:

- 1) Experienced bush pilots who have flown in the area for several years.
- 2) Planes in tip-top condition.
- 3) Good radios which must be completely overhauled at the end of the season because of shocks taken when landing on rough ice.

Mr. Paul Tietjen and Kenneth Toovak spent two weeks during May in Seattle participating in the trial runs of the new ARL boat and becoming familiar with its operation.

The monthly progress reports for May follow:

ARL OCEANOGRAPHIC VESSEL:

"During September 1958, ARL opened negotiations with Mr. William Garden, a naval architect from Seattle for the design and construction of a small research vessel suitable for oceanographic use in the Arctic. Plans were formalized and a bid let to Vic Franck's Boat Yard, Seattle for the actual construction. The boat was to be ready the first week of May for acceptance trials at Seattle so that it could be shipped on the first Alaska Steamship carried sailing to Nome, Alaska this spring."

"The boat, which as tentatively named the 'Natchik', is 38 feet overall, 11 feet in breadth and draws 4 feet of water. The lines of the hull were slightly modified from the 'Greenland Cruiser', a small boat which is carried by ice breakers. The hull is of heavy construction; planking is 1-1/2" yellow cedar covered by 5/8" of iron bark which is sheathed with a stainless steel around the water line. Frames are 1-1/2" x 2-1/2" oak on 12" centers, the keelson and sister keelsons are a total of 9-1/2" x 30", with a keel of 5-1/2" x 7-1/2" of gum wood protected with a 1" bronze deck shoe. All topsides are covered with fiberglass. The layout includes a scuppered aft deck about 15 feet long, a cabin 14 feet long and a foc'sle which has four bunks. The woodwork of the cabin is teakwood, the floor is covered with vinyl tile, all surfaces which are possible to soundproof have been covered with 1" of sound absorbed tile. The cabin has a center aisle, to the starboard is the lavatory (equipped with a water closet and a sink), the galley and the controls. On the port side there are the radio and the fathometer mounted over a large work counter. All counter tops are stainless steel. There is a sink for the galley and another sink for laboratory use. The boat carries 120 gallons of fresh water in tanks under the aft deck. There is ample storage space under the counters."

"The foc'sle has four bunks which have 4" thick foam rubber mattresses. There is some storage space for the crew's gear."

"The main engine is a 6-cylinder 115 HP Chrysler marine engine which turns a 27" propeller through a 3:1 reduction gear. The shaft is 1- $\frac{1}{2}$ " monel and runs in Cutless rubber bearings. The propeller is protected by a bronze basket. Auxilliary power and 110 V AC electricity is supplied by a completely automatic Koehler gas line generator. There is a hydraulic pump-motor on the main engine and the 110 volt generator. Valving is so arranged that either engine will drive the main winch and the generator will also turn over the main engine screw at 650 RPM, which allows 2 mph headway in case of emergency. Both engines are cooled through heat exchangers. There are two auxilliary water pumps on the main engine which circulate water through the heat exchanger, a radiator in the hydraulic system oil tank, or can be valved to pump water into or out of any of the three compartments of the hull."

"There are two 250 gallon gas tanks on board, each constructed of $\frac{1}{2}$ " monel and fitted with inspection ports and baffles. There is an auxilliary oil tank of 30 gallons capacity for the main engine and a 40 gallon tank for the hydraulic system. Both of these tanks are of the same construction as the main fuel tanks."

"Operational electric power on the boat is 12 volt DC which is supplied from two sets of lead acid batteries which are charged by two generators driven by the main engine. Running lights, cabin lights, and the automatic pilot operate on the 12 volt DC system. The operation of the fathometer, the galley and the heating of the cabin are accomplished by the AC generator."

"The boat is equipped with a 150 watt 8 channel radio, a transistorized completely self contained radio direction finder, an echo sounder which operates to 36,000 feet, an automatic pilot, a one-mile search light, magnetic compass, gas sniffer, complete CO₂ fire extinguisher system, a 14-foot tender with an 18 HP outboard, davits for lifting the tender to the cabin roof and an electric anchor winch."

"Mounted on the stern of the boat is an A-frame constructed of 3" pipe, hot galvanized as a unit. There is a trailing frame which can be raised from water level to 12 feet above the water with a small three-ton hand winch mounted on the A-frame. The main winch is of special design and is mounted in the rear hold. It had 12,000 feet of 5/32" oceanographic cable on it. The winch is driven by a hydraulic motor which can be driven by either the generator engine or the main engine. The cable can be retrieved at a continuously variable speed from no movement to about 500 feet per minute. Control is through a hydraulic valve mounted on the outside of the cabin. The winch cable is led under the aft deck to the A-frame, leaving the deck unobstructed."

"Acceptance trials, with Paul Tietjen and Ken Toovak representing ARL, were run during the first and second weeks of May at Seattle. There were 16 hours of dock trials in addition to four short cruises. A few minor difficulties were encountered, but there were to be expected with a craft as complicated as the 'Natchik'."

"Time trials showed as follows:

1650 rpm --	6.7 knots average
1800 rpm --	7.3 knots average
2050 rpm --	7.9 knots average

Top rpm is 2550, but it was impossible to run the engine over the measured mile at this speed because of the newness of the engine. We estimated the 'flank' speed at 2550 rpm to be better than 9 knots. Gas consumption at 1800 rpm would be about three gallons per hour; 500 gallons of fuel would allow 180 hours of operation of the main engine alone at a speed of 8 mph or a range of about 1500 miles. The 1650 rpm cruise would allow about 10% more range. Additional gas could quite easily be carried in drums on the aft deck."

"We weighted the winch line with about 100 lbs. of steel for testing the operation of the winch. Control is very precise; the winch lines can be moved a fraction of an inch at a time by an inexperienced operator and speed can be varied to suit the operator. Control is simple, one lever which when pulled up brings the cable in and when pushed down lets the cable run out. We ran out about 6000 feet of cable which was fouled in the bottom of Puget Sound. The winch was able to pull the boat backwards against the tide and wind and the engine running at 1400 rpm. We thought the cable might snap, yet the winch had not slowed down."

"The sounder worked perfectly. The transducer is mounted inside the hull in a chest filled with castor oil in the aft hold. The automatic pilot worked perfectly after a few minor adjustments. The boat can be steered from anywhere on board using the automatic pilot because the pilot has an auxiliary control connected to 15 feet of cable."

"The engine room, which is located under the cabin is a maze of water lines, hydraulic lines and valves. Everything has been coded and all water lines have three-way valves on them which make it impossible to open a through-hull connection by mistake and sink the boat. Both power units are quiet and the engine room is completely soundproofed. The noise level in the cabin is about the same as riding in an automobile at 30 mph. Operation of the boat is simple, the main engine starts by pushing a button, the generator starts automatically by closing one switch."

"The 'Natchik' handles and feels like a craft twice its size, probably because it weighs close to 18 tons. It is stable, has a 6-second roll and a very easy motion in a choppy sea. The boat responds slowly to power and helm, again because of the weight, but handling characteristics are excellent, partially because of the hydraulic reverse gear on the main engine. Mr. Garden said that the boat will always right itself; if it were not to swamp through the large cabin windows it would easily survive a 360 degree roll. A 90 degree roll would be of no consequence except to those on board caught unawares. It has 5 feet of free-board forward which makes it a dry boat in a heavy sea. The hull runs clean; at 7 mph there is no visible wake."

"Workmanship during the construction of the craft was excellent. There are many small touches which were added by the builder which make the 'Natchik' a beautiful thing besides being a sturdy work boat. The finest materials were used. All wood was clear and well seasoned."

"With reasonable care and barring an unfortunate encounter with piling ice, the 'Natchik' should have a long existence."

(Tietjen)

SEA VALLEY AND TIDE STUDIES:

-7-

"The winter oceanographic program was continued during the month. Between 1 May and 6 May, four stations were occupied from the ice pack in the eastern Beaufort Sea using Barter Island as a base of operations. One of the stations was occupied near Herschel Island, another off the MacKenzie Delta. The sea ice became more broken each day and large leads developed. One lead parallel to the coast line and 25 miles offshore was scouted and found to be more than 150 miles long. The aircraft returned to Barrow on 6 May and were out of service for maintenance until 13 May."

"On the 14th, operations were moved to the Colville Delta. A station 50 miles offshore was attempted, but no suitable landing site could be found due to the shattered condition of the ice. From the 15th to the 20th, ice fog and high winds prevented operation in the ice pack. Four attempts to fly over the fog were made, but in each instance we were forced to return to the Colville Delta or to Umiat."

"Between the 21st and the end of the month, a large area of open water west and north of Barrow, and the advanced state of disintegration of the sea ice, prevented further work on the pack."

"The tide station was continued in operation during the month. Sea water samples also were tested."

(Beal)

IONOSPHERIC RESEARCH:

"The vertical incidence ionosphere soundings program has been operated as routine throughout the month."

"An attempt has been made to ready the meteor propagation project to start operations on 1 June. However, the Laboratory in Boulder has found a component in the present transmitters unreliable during long-time operation and a replacement has been issued. It is now being installed and the new target date is 15 June."

"During the month the immediate area around the station was cleared of accumulated snow with the assistance of a D-8 and operator from ARL."

(Bengaard)

SEA ICE MICROMETEOROLOGY:

"Most of the month was spent in calibration and modification of instruments and recorders. All the equipment is now ready for installation. In addition, ice temperatures and light intensity in the sea ice have been taken regularly at a site prepared $\frac{1}{2}$ mile northwest of the Camp."

"The modified Wanigan, which will be used as an instrument hut, was towed to a site near Eliutkak Pass. Only electric power, tower erection and instrument hookup are necessary for operation. This is expected to be completed by 15 June."

"The instrumentation, prepared and modified for the initial installation, consists of the following:

- 1) One Eppley pyrhelimeter for incident short-wave radiation.
- 2) Two inverted Eppley pyrhelimeters for reflected radiation from beach and ice.
- 3) Net radiation over both beach and ice.
- 4) Total hemispherical incident radiation.
- 5) Dry bulb air temperatures at $\frac{1}{2}$, $\frac{1}{2}$, 1, 2, 4, 8, and 16 meters, by means of thermocouples.
- 6) Wind speed at these same 7 levels.
- 7) Ice and soil temperatures.
- 8) Possibly, light intensities at various depths in the ice."

"The recording group consists of 2 Brown strip chart recorders, a single channel continuous pen recorder for the incident short-wave radiation and the remainder on a 20 channel, dual range, printing recorder."

"Experimentation for recorded humidity measurements has not brought practical results."

(Makela for Church)

AURORA AND EARTH POTENTIAL:

"The Riometer was operated throughout the month with only minor difficulties."

"The Auroral Radar was operated throughout the month."

"The Earth current recorders were operated throughout the month."

(Baumgartner for Elevey)

OPERATION AT THE LAKE PETERS CAMP:

"On April 24 an ARL plane flew an ice reconnaissance team to the USGS-AFCRC-ONR campsite on Lake Peters. Conditions were found to be satisfactory for landing ski aircraft. The first USAF C-123 transport brought in the initial party led by Dr. G. W. Holmes on April 27; by May 4 a runway for wheeled aircraft had been cleared and by May 8 six C-123 flights had delivered 38,000 pounds of supplies to the lake. On May 9 Holmes returned to Washington leaving F. L. Riddell in charge of the Camp."

"Ice strength and limnology studies have been carried out by the five-man party since the initial occupation of the Camp. A new generator house and shop has been completed. An insulated floor and ceiling have been placed in the mess building, and construction of a third permanent building has been started."

(Riddell for Holmes)

"The first project personnel reached the lake on April 27. By the time the ice temperature first reached the melting point on May 18 a preliminary set of measurements had been made of the primary variables for determining the strength of a melting ice sheet. Ablation poles and ice thickness stations to determine the melt at the top and bottom of the ice sheet had been established at nine stations on Lake Peters and Schrader, and four thermistor cables were set in the ice.

"Thirty small specimen, ring-tensile ice strength tests had been completed and a few small specimen compression tests had been made. A dozen in-place beams were broken and five in-place punch tests have been completed."

"A continuous record of incident radiation, radiation transmitted through the ice, net long wave radiation, and thermal lapse rate are being recorded on an electrical potential recorder near the center of Lake Peters. Preliminary studies of the crystal structure of the ice have been completed. Seismic measurements of the elastic constants of the ice have also been started."

"Between May 18 and June 1 bad weather has prevented any significant thinning or decay of the ice and the ice temperature has frequently been below 0°C."

LIMNOLOGICAL STUDIES - LAKE PETERS:

"The investigator arrived at Lake Peters on April 29. Single thermistor water temperature profiles were begun immediately in Lake Peters and Lake Schrader and have been continued at three to four-day intervals. Profiles at several locations have revealed that there is no lateral variation and thus, at the present time, only one station in each lake is being sampled. One set of oxygen saturation profiles has been made in each lake and will not be repeated until just before the ice starts to 'moat'. A level line has been established near camp and the ice and water level heights are measured each week, relative to a gaging station established during 1958. Radiation through the ice was measured in both lakes and then the photocell was attached to the Brown-Honeywell Recorder giving a continuous 24-hour record. Biological primary productivity is measured at four-day intervals using two methods, the C_{14} and Chlorophyll α , at one station in Lake Schrader. In connection with this study, the bicarbonate concentration is tested at the sampling depths."

"In general, winter conditions seemed to prevail under the ice until mid-May when the lakes lost most of their snow cover. Compared to 1958, this year's melt is at least 2 weeks late and streams have begun to flow only within the week.

(Hobbie)

GEOLOGIC AND GEOMORPHIC INVESTIGATIONS:

"The early portion of the month was utilized in hand sampling some of the holes drilled during the previous fall. The holes drilled this spring which had been sampled, at one-foot intervals, from the bottom of the auger bit were described and selected horizons were hand sampled."

"Two ten-foot holes were drilled within the Camp area for PS&D. The investigator sampled and described them before they were filled."

"Three twenty-foot holes were drilled within Fresh Lake before it thawed. These holes were 100 to 200 feet from shore at the east, west, and south sides of the Lake. The holes were sampled from the auger bit at one-foot intervals and hand sampled at selected horizons. Samples were taken from the top six inches of frozen material beneath the lake ice. These samples will help determine the effect residual salts, from the formation of the lake ice, will have upon the salinity of lacustrine sediments."

"To date seventeen 18 to 20-foot holes and fourteen 10-foot holes have been drilled and sampled. Of these, 80 samples have been analyzed for CA, Mg, and Cl. Forty samples from holes drilled for testing the foundation materials of the proposed Barrow High School, have been analyzed for Cl. All the samples have been processed for moisture content and per cent settlement."

(O'Sullivan for Hussey)

GEOLOGIC MAPPING AND BOTANICAL SURVEYS:

"Lewis, Spetzman, and Chase arrived at Barrow on 28 May and were flown to Lake Peters on 28-29 May."

(DARL)

POPULATION DYNAMICS OF THE POMARINE JAEGER:

"The investigator arrived at Barrow on 14 May. On 15 May the investigator, with Dr. Tom J. Cade of the Lemming project, tried to get some idea of lemming abundance under the snow. Three stretches of tundra $\frac{1}{2}$ of a mile long were bulldozed clear. The exposed ground was examined for lemming sign. The results indicate a very low lemming density."

"An overland weasel reconnaissance was made along the Meade River Coal Mine trail from Barrow to the Inaru River. The results indicate that the low in lemmus and its avian predators extends to the Inaru."

"May 20 through 29 were spent at the Pitmegea River. This area was visited to ascertain the extent of overwintering of a high population of Microtus oeconomus present late last summer. We were also interested in studying the spring bird migration and onset of breeding activities. A considerable population of Microtus was found to have survived the winter. Three pairs of Snowy Owls were present on one square mile when we arrived. Short-eared Owls were also present, their density was estimated at 6-8 individuals per square mile. On 23 May Pomarine Jaegers arrived and immediately set up territories. Initial density was 4-6 pairs per square mile. The Snowy Owls departed shortly, but several pairs of Short-eared Owls set up territories. It looks therefore as if the Microtus high has induced breeding efforts on the part of two species of predators which have not bred in this area during the past season. If Pomarine Jaegers do breed here it will be the first time they will have done so in response to a high of Microtus."

(Maher)

MAGNETIC OBSERVATORY:

"The geomagnetic project at the Arctic Research Laboratory was continued during the month of May. Declination, Horizontal Intensity, and Vertical Intensity were determined through observations conducted weekly at the absolute building near Barrow Village. An earth inductor was used to measure Vertical Intensity. Declination and Horizontal Intensity were measured with a Ruska magnetometer."

"Changes in the magnetic field were recorded photographically 24 hours a day for the month by the Insensitive and Rapid Run magnetographs. Three days records were lost on the Rapid Run magnetograph due to electrical trouble in the recorder."

"Commencing about 1200 (150 WMT) 7 May, there was a gradual build up of magnetic activity. This storm carried on with moderate to slight activity until 23:10 on 10 May, when there was a very large sharp sudden impulse in all three elements, followed by severe magnetic activity until 12:00 on 12 May. The intensity of the storm dropped to moderate activity from that time until the end of the storm at about 19:00 on 25 May. The ranges of the magnetic elements during the storm were as follows:

Declination: 12° 06'
Horizontal Intensity: 2730_γ
Vertical Intensity: 990_γ

During the week of May 10-17 radio communications were blanked out."

"Processing of data and records was continued during the month."

(Meyer)

MIGRATION AND DISTRIBUTIONAL ECOLOGY OF EIDER DUCKS:

"The spring migration of eiders was very late in 1959 and no evidence was obtained of any striking mortality such as occurred in 1958 (the migration in 1958 was early). Temperatures in early April were well below average, but from April 22 until the end of May temperatures were not abnormal."

"The first King Eiders were reported on April 25 and May 2. From May 7-21 only a few flocks were flying each day except for May 16 when the first wave of any proportions occurred. The investigators also arrived at Barrow on that date, and during the next ten days frequent visits were made to the native whaling camps. From May 4-15 and 19-22 winds were predominantly in the N-NE-E quarter, unfavorable for migration. A flight was made to the Pitmegea River and back on May 20, but no eiders were seen on the coast. From May 22-26 big migrations of King and Common Eiders took place (reaching as many as 10,000 per hour). From May 28 through June 3 there was little or no movement. On May 29 Thick-billed Murres were seen moving in large numbers (1500 in 1½ hours). Common Eider migration continued into June."

"Reports from rivers inland (May 16, 18-27) showed no evidence of inland migration of eiders in May, except two pairs of Spectacled Eiders seen along the Meade River on May 26. From May 31 through June 2 a trip inland was made by weasel to the Inaru and Meade Rivers. The tundra and rivers were frozen hard and the only eiders seen were four male King Eiders. There was no evidence yet of the migration of Spectacled or Steller's Eiders."

(Myres)

AURORAL PROPAGATION STUDIES:

"Records have been taken and scaled for the complete month from the Receiver Site."

"Twenty-six poles were set for the perimeter wire of the four ground planes at the Transmitter Site. Power was brought into building 355 but the voltage was found to be too low to operate the equipment. Request for a change in line voltage was made."

(Workman for Petrie)

STRUCTURAL AND MECHANICAL PROPERTIES OF ICE:

"No testing was done on the strain gage station due to the unavailability of loading equipment."

"Construction of the temperature control panel has been completed for the temperature controlled laboratory."

"Repair and modification to a second 'Micro-Max' recorder has been completed to provide temperature control for the second laboratory."

The ice freezing apparatus has not yet been completed."

"Twenty cores of fresh lake ice have been obtained and stored to provide specimens for study after completion of the laboratories."

(Peyton)

ECOLOGY OF LEMMINGS:

"Cade departed Berkeley for Fairbanks on 11 May. He remained at the University of Alaska Campus until 14 May, making several local trips to observe birds, including one up the Steese Highway to mile 56. Peregrine Falcons were observed at Chena Bluffs. An old shrike nesting locality was investigated at mile 26.4 on the Steese."

"The investigator departed Fairbanks for Barrow on 14 May, arriving at 11 a.m. He was outfitted at ARL and toured the study areas around Barrow."

"15 May - Maher and I had Joe Ahgeak make three scrapes in Central Marsh to see what sign of lemmings could be obtained in that manner. Three sites of winter activity were revealed."

"16 May - Maher and I followed the Coalmine trail to the Inaru River and back in a weasel. Snow conditions were observed and some willow ptarmigan were seen along the Inaru."

"20 May - Maher and I left Barrow for the Pitmegea Camp. There we spent 8 days observing spring migration of birds, trapping for microtine rodents, and observing the initial settling down of birds for breeding. Voles were still common but not in the high numbers of the previous summer. A few Snowy Owls were present but not breeding. Short-eared Owls were common, and some pairs appeared to be settling to breed. All three species of jaegers were present. A local pair of breeding gyrfalcons was observed and over 100 pellets were collected for analysis of their food habits. Rough-legged Hawks were also present in the area. Pintail ducks were especially abundant and a preponderance of males was noted."

"29 May - departed Pitmegea, flying down the coast past Capes Lisburne and Thompson south to Kotzebue. From Kotzebue, we followed the Noatak Valley into the Brooks Range, cutting across the range at Feniak Lake to head across the slope to Barrow. This reconnaissance gave us some familiarity with a sector of NW Alaska not previously seen by us."

"31 May - departed Barrow for the Lake Peters Camp, where I will spend two weeks studying birds and mammals in the Brooks Range Province."

(Cade for Pitelka)

NFR-4 OIL FIELD INVENTORY:

"The inventory of oil field property at Barrow continued during the month. Some transfers of equipment to other Federal Agencies were made."

"The cat-train rented to Colorado Oil and Gas Company was returned."

"Saltsman departed Barrow on 23 May for medical leave."

(DARL for Saltsman)

AERIAL PHOTOGRAPHY OF SEA ICE:

"During the first month in the field it was found necessary to shift the approach of the study to conform to the physical limitations of the equipment, weather and time of year."

"Due to an oversight on the part of the investigator, the aerodynamic problems of modifying the ARL skin-stressed Cessna 180s to accommodate a vertical aerial camera were not fully explored until after arriving at Barrow. It was found that an installation of this type in such an aircraft would mean that the performance of the aircraft would be substantially reduced in the light of its current role. Furthermore, to remove the aircraft from operation at this time of year, in order to make such a modification, would seriously hamper the program of ARL in supporting other projects. It was therefore decided to omit, for this season, that portion of the project dealing with vertical stereo-pairs and relief measurement of surface ice features. The beginning of the spring break-up of the pack ice brought the end of the single engine aircraft operations over the pack so that much of the intended effort would have been thwarted in any event. However, discussions were held with pilots and researchers familiar with conditions and characteristics of the polar pack to find the various personal criterion used to estimate the ice conditions."

"In view of the foregoing circumstances it was felt that the best course was for the investigator to gain first hand knowledge of sea ice by walking over and becoming familiar with the fast ice remaining along the shore in the Barrow area. This was done singly and in company with Eskimos who were familiar with the ice. Photographic flights were made pursuant to the availability of the aircraft but only 35 mm Kodachrome was exposed. This latter was done partly because of the film cost, per se, but primarily because of weather conditions - twenty-three days with low overcast, often below 500 feet - which forced such low flying heights that an inordinate amount of film would be required to cover the area."

"The familiarity with and availability of this ice led to the opportunity to investigate the puddling of ice and to correlate puddle depth with color tone. Low oblique aerial photos will be taken in an attempt to solve this problem without having to solve the considerable problems of moving about in the polar pack during the summer season."

(Sater)

ENVIRONMENTAL FACTORS AFFECTING THE DISTRIBUTION, MOVEMENTS, & NUMBERS OF POLAR BEAR:

"A field trip was made by the investigator during the period 9 April 1959 through 21 April 1959 to the Arctic Research Laboratory at Point Barrow."

"This is part of a larger, long term project, to obtain information about polar bear and the environmental factors affecting their distribution, movements, and numbers in the Point Barrow area. Secondarily, information was to be obtained about the polar bear take, and polar bear skeletal and reproductive material obtained."

"The prime method of obtaining data was to contact natives, Arctic Research Laboratory personnel, polar bear hunting guides et. al. and by means of inquiry, attain the objectives in a preliminary fashion."

"Most of the information obtained is of a fragmentary nature, is not conclusive, at times conflicting, but nevertheless valuable. Its value will be realized when it is evaluated, correlated, and integrated with future data."

"A fairly comprehensive tabulation of the 1958-59 bear kill for the period up to April 21 for the Barrow Area was obtained. This information was turned over to Sigurd T. Olson of the Fish and Wildlife Service for correlation with other kill data, to be used in a final tabulation of the year's take for Alaska. The kill for the Barrow Area as of April 21 was at least 41. The results are tabulated below:

<u>Kind of Bear</u>	<u>Status of Hunter</u>	
	<u>Native</u>	<u>White</u>
Adult male	6	25
Adult female	3	4
Cub - male	1	-
Cub - female	1	-
Unknown Adult	<u>1</u>	<u>-</u>
	12	29

"Polar bear hunting by whites at Barrow is done by plane. According to information received from the guides, distances flown to bear hunting areas are approximately 30 to 100 miles, many times southwest along the coast. At Kotzebue the guides were flying out to 100 to 175 miles. Generally, the larger bears are sought out by the guides; the usual guarantee to the hunter is a bear 8 feet or larger. This may account for the predominant number of males killed by white hunters."

"The skull of a 2 year old male bear, and the testes of another were obtained for the University of Alaska collection. The testes are from a bear whose skull was loaned to the University by guide Charles Gray. Also received on loan was a skull from guide Leroy Shebal."

"It was learned, upon arrival in Barrow, that the cub, a female, was taken after Ron Coates, a native, shot the sow at Oliktok Point near POW 2 on February 26, 1959. The cub was seen on April 10 at Coate's home in Barrow, where it was on display. The cub was taken from him on April 13. Coate's wife said that they had been feeding the cub condensed milk and seal blubber."

"The cub voraciously consumed seven 8-ounce bottles of a half and half mixture of condensed milk and water with a teaspoon of sugar added to each bottle. With each bottle of milk the cub became progressively subdued. Impressive was the great deal of attention the cub needed and demanded, and it suggested the great attention a mother bear must have to give to one or two cubs."

"The cub, which weighed 28.5 pounds, was shipped out the next day, April 14, to the Fish and Wildlife Service at Fairbanks who transferred it to Dr. Raymond Hock at the Arctic Aeromedical Laboratory."

(Vogelsang)

ARCTIC ICE AND PERMAFROST:

"The regular schedule of geothermal measurements are continuing at Barrow, Fairbanks, and Glennallen, Alaska. The readings at the latter installations were obtained by the Army Corps of Engineers and the Bureau of Public Roads. Phillip Sovalik continued thermal observations at key installations in the Barrow area to obtain supplementary information needed in the interpretive studies."

"Galley proofs were corrected and returned for 'Periodic heat flow in a stratified medium with application to permafrost problems,' USGS Bull. 1083A."

"Greene is progressing with a systematic analysis of the thermal measurements from Glennallen, Alaska. Preliminary results indicate that the work will yield significant new information about the thermal effects of a roadway on permafrost. Some of the data should be amenable to theoretical treatment."

"Lachenbruch visited Washington to discuss project activities with representatives of cooperating agencies. He also attended other meetings including one to discuss a proposed program of lunar research for the Survey."

(Brewer)

/a/ Max C. Brewer
Director
Arctic Research Laboratory

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National Academy of Sciences
2101 Constitution Avenue, N. W.
Washington 25, D. C.

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 6

NOTE: This report contains information obtained from the Air Force, Army, Navy, and other sources. Courtesy requires our respecting the prior rights of these sources with respect to public dissemination of information extended for private use. Accordingly, contemplated further dissemination or publication interests should be discussed with the original source or with the Secretary of the National Academy of Sciences' Committee on Polar Research

ADAK

Capt. Roland A. Merullo, Commanding

September and October 1959

Fixed Frequency Backscatter - Equipment is not operational as yet. Frequency assignments have been received and crystals are on their way.

Ionospheric Physics.- In September, as fall and winter approached, the daily trends observed on ionograms gradually changed. The E layer appeared later and disappeared earlier, the F layer seldom divided into F1 and F2, and the daily maximum fo F2 increased. In October, the daily maximum of the fo F2 became higher and higher, with the approach of winter. Critical frequencies as high as 13 megacycles were recorded. Several disturbed days occurred during which records similar to mid-summer were obtained.

General - In September, there was no snowfall during the month. Total rainfall was 7.44 inches, average wind velocity 13 knots with maximum gusts of 63 knots on the 10th and 21st of September. Average temperature was 50°F, with a maximum of 66°F on September 1 and a minimum of 46°F on September 28. In October, the first snowfall since spring occurred on 27 October and the total for the month was 1.6 inches. Total rainfall was 6.99 inches, average wind velocity was 13 knots with maximum gusts of 67 knots on October 4. Average temperature was 44°F with a maximum of 55°F on October 1 and 2 and a minimum of 39°F on October 29 and 30.

Personnel - PFC Peter P. T. Li reported for duty September 22. PFC Walter D. Kolander was appointed to that rank on September 28. SP4 Bruce S. McNichols was appointed to that rank on September 14. He left the station on October 28 for reassignment to US Army Signal Ionosphere Station, Fort Monmouth, New Jersey.

STATION CHARLEY

Status Report for September 1959

K. O. Bennington, Scientific Leader

Notification was received that the designation of the Drifting Station was changed to Station Charley.

Part One

This will be the final monthly report for the summer location group. Preparations are being made to backhaul equipment not required for the winter period. Storage space has been provided at Ladd AFB to accommodate equipment to be returned to the station at any future period.

During the month there were 2 air deliveries, one mail drop from Ptarmigan on September 10 and mail, 700 pounds of supplies and equipment were dropped by C-124 on September 21.

Although the melt season terminated in August, temperatures were not consistently low enough to strengthen the runway ice sufficiently for the early aircraft period. Weak spots and drainage holes have been much slower to freeze because of brine content even though fresh surface ice was scraped into them. The daily status reports have maintained a continuous evaluation of the runway capability from unserviceable to some emergency possibilities to present C-54 capacity. The original predictions for a 1 October runway traffic capabilities was made in the 27 August status report to aid in rotation planning for parties with a previous 15 September target date. A short melt-period in mid-September caused an additional predicted delay with serviceability date advanced to first week in October, an estimate which proved correct and has remained unchanged.

The Point Barrow airstrip has been closed for the greater part of the month, which has complicated planning for earlier air landings. The distance is too great to use C-123 aircraft effectively from Point Barrow and this aircraft is incapable of operating direct from Ladd.

Currently the first crews scheduled for October 2 rotation, which involves some personnel overlap, will be completed with the first two aircraft within the first week of October, weather and schedule permitting.

Part Two

Investigators: No change.

Part Three

U. S. Weather Bureau - Upper air observations terminated because of hydrogen generator failure. Monthly summer follows: Coordinates beginning of month 77°57'N 168°44'W. End of month 77°53'N 173°33'W. Average temperature -8.0°C, Highest 0.6°C on 11th and 12th. Lowest -22.8°C on the 27th.

Average station pressure 30.129 inches. Highest sea level 30.48 inches on the 27th. Lowest sea level 29.37 inches on the 12th. Precipitation 0.60 inches. Snowfall 0.55 inches. Average net change in snow depth pressure 4 inches. Prevailing wind direction east-north-east. Average speed 10.4 knots. Fastest mile 37 MPH on 12th from South-South-east. 24% possible sunshine. Average sky cover 8.2 Number days clear, 1; partly cloudy, 10; cloudy, 19. Number of days visibility $\frac{1}{2}$ mile or less, 4. Average height 53 radiosondes 28,433 meters. Climat ice 20580 8702X climat temperature ice 14415 60618 29486 21695 54527 68842 70278 81XXX 89500 16XXX 15570 03XXX 61209 83XXX 06779 96XXX. Wattenbarger.

USN Underwater Sound Laboratory - Personnel conducted propagation runs with the assistance of a Navy P2V operating out of Alaska.

Explosives sufficient for 1 day's operation were set aside and saved for use in conducting transmission measurements with T-3 for the purpose of obtaining maximum seasonal change effect.

Under ice reflectivity broad band measurements were conducted. These will be analyzed to determine narrow band reflectivity coefficients versus angle of reflection.

All program work was secured 25 Sept., equipment and instrumentation was then secured in preparation for personnel departure. Kelley.

USN Hydrographic Office - Relative ice motion studies. Until September 10th, time-lapse photography was continued on a regular basis and 400 feet of film were exposed. On September 10th a breakdown in equipment occurred, one of the coils in the drive motor of the camera having burned out. Attempt was made to jury rig solenoid and operate on the camera internal string and the single frame release instead of the external motor drive. It was not found possible to use this arrangement, probably due to the low temperatures encountered within the housing, freezing the single frame release action. Replacement of the heaters with more powerful ones was negated by the fact that increase wattage would cause a greater line drop rendering the solenoid and timer unusable and endangering the blower motor. After several unsuccessful attempts at operation, the project was abandoned on September 15.

Studies of ice surface phenomena. The study of meltpool freeze was continued through September 28 using time-lapse photography. A total of 400 feet was exposed. The project was stopped as operation on the ice floe by this Office was ended. Gerson.

Lamont - Submarine geology: Oceanographic winch received and installed. The Hydrographic shelter covered and prepared for winter temperatures. 4 camera stations and 3 bottom trawls taken, corer received but lacking cutting edge and piston. Seismology: Under water sound program and daily reflection shots were taken throughout the month. Refraction profile was attempted but was unsuccessful due to equipment (Radio) failure. Vertical seismometer recorded on 10-second until 21 September; recorded on 40-second September 21-30. Nuclear resonance magnetometer and microvariobarograph recording was continuous. D, Z, H magnetometer recorded for 2 weeks. Cromie.

University of Washington

Oceanography - Summary of work done from June 16 to September 30, 1959. One Hydrographic shelter was erected equipped with a winch and tripod. Oceanographic stations taken: 344 temperature measurements, salinity samples and oxygen analysis; 320 phosphate and 296 silicate samples. In addition, 223 bathythermograph traces, 189 bottom samples and 5 plankton hauls were secured.

One week before the end of the period an Ekman-Mertz current meter was airdropped to the ice. Some damage resulted in transit changing calibration and requiring repairs. In view of the short time remaining and the damage the instrument will be returned to Seattle.

No major problems occurred. The Hydro hut was necessary for efficient work. Late in the season heat was needed for the instruments. A Herman Nelson gas heater was used.

In retrospect, the use of an Echo Sounder and full use of the current meter are the two main points missing this season. Gast and Perry.

Micrometeorology - Air and ice temperature profiles, total radiation incidents, and reflected shortwave, wind direction, ice thickness, pond freezing, frost and snow accumulation and ocean temperature measurements continued as routine. The freezing of the flow continued during the month with a minor interruption near the middle of the month. This due net positive radiation, high temperature and rain. The highest ice temperature at the end of the month was -0.6°C at the 150 cm. level, approximately the middle. Cooling below the ponds has not started because most ponds are not frozen. Pond ice thickness average 14.6 cm. with a range of 2.3 cm. on September 3 and 32.4 cm. with a range of (garbled). The increase in the range of the thickness is due to uneven snow cover of the ponds. Five thickness gauges were installed during the month. A small ablation from the bottom was indicated by these gauges.

Navigation - The length of the drift path was approximately 152 nautical miles. The wind drift ratio is about 48 to 1. Hanson and Sommerfield.

Sea Ice Petro-Fabrics - Thin section and universal stage work continued throughout the month. Special attention currently given brine pocket enlargement and drainage.

University of Washington
Dept. of Meteorology and Climatology
Seattle, Washington

K. O. Bennington

STATION CHARLEY

Status Report October 1959

Dan Hale, Deputy Scientific Leader

Part One

October, a busy month, saw, with one exception, full replacement of the entire station complement, the completion of the air-dropping of 180 tons of fuel, the delivery of 16 Helicop Huts in addition to 15,000 pounds of food and materials, and the beginning of the removal of all Jamesway huts except those necessary for laboratories and warm storage. Charley's first and only female occupant, Lt. Fran Zinski visited the station October 3. Altogether, 15 planes landed during the month - one A 16, two C-54's, and 12 C-130's. On October 13 a plane load of scientists and project administrators descended upon the station. For awhile the station assumed aspects of a carnival midway, with each laboratory offering guided tours; the grand finale occurred in the mess hall where many New York steaks were rapidly devoured.

Part Two

The new military complement of the station is as follows:

Captain Arthur Schroeder, Base Commander
T/Sgt. Robert Marshall, Ranking NCO
S/Sgt. John Justice, Mess
S/Sgt. James Dorsey, Mess
S/Sgt. Ted Marasaki, Radio and Electronics
S/Sgt. Ray Scott, Medic
Airman/1st Hildon Carter, Supply
Airman/1st Harold Frizzell, Electrician
Airman/1st Gary Stanfill, Heavy Eq. Maintenance
Airman/1st William Curry, Communications
Airman/2nd Harold Gomex, Mess
Airman/2nd William Dunkle, Communications
Airman/2nd Frank Yates, Heavy Eq. Maintenance

The new scientific complement is as follows:

John Barter, Meteorology
Warner Chapman, Meteorology
Dr. Dan Hale, Oceanography, Micrometeorology, and Navigation
Thomas Herron, Oceanography and Seismology
Dr. Victor Hessler, Earth Currents
Dr. Charles Knight, Sea Ice Petrofabrics
Don Makela, Micrometeorology
Austin Post, Oceanography and Navigation
Robert Walker, Meteorology
Oliver Wattenburger, Meteorology
Roy Willie, Oceanography and Seismology

Part Three

U. S. Weather Bureau -

October Statistics:

Average Temperature	-17.3°C
Highest Temperature	-0.6°C on 6th
Lowest Temperature	-32.8°C on 16th
Average Barometric Pressure	29.966 inches
Highest Sea Level Pressure	30.59 inches on 4th
Lowest Sea level Pressure	28.94 inches on 21st
Precipitation	0.79 inches
Snowfall	7.9 inches
Average Net Change Snow Depth	7.0 inches
Prevailing Wind	WNW
Average Wind Speed	10.4 knots
Fastest Wind	39 MPH from ESE and WNW on 5th and 7th
Per Cent of Possible SS	9%
Average Sky Cover	7.2
Number of Days Clear	1
Partly Cloudy Days	12
Days Cloudy	18
Number of Days Visibility ¼ mile or less	11

Radome building and radome were completed and upper air program resumed on 31st. Two radiosondes taken. Wattenburger

ONR Task Nr. 307-261

Earth Current Studies, Geophysical Institute, University of Alaska -
Installation of equipment was started on Oct. 4, and the first records were taken on October 10. Continuous "N-S" (parallel to the runway) and "E-W" Esterline Angus records have been taken since Oct. 12. Early records with 500 foot electrode spacings and maximum gain on the amplifiers showed very little activity. Observed mv/km activity in sea water was smaller than had been anticipated. Electrode spacing was increased to 1.08 and 1.07 kilometers. At this spacing measurable activity is observed almost continuously and several disturbances have gone off scale.

Depth electrodes have been installed at a spacing of 0.5 km., and records taken on a sensitive Azar recorder with the electrodes submerged to a depth of 200 meters.

A shelter has been constructed of non-magnetic materials to house an Askania Magnetic Variograph, and the control wiring is partially completed.

Current magnitudes are much less than at Barrow and College - i.e., a range of about 100 mv/km compared to 1200 mv/km at College. Casual inspection of the records indicates that the directional effect is much more

variable than that observed on land. The 200 meter depth records are apparently identical in form with the surface records. V. P. Hessler

USAFCRC - Lamont Geological Observatory

Seismic reflection shots for ocean depth are being taken daily. A precision depth recorder, long period seismograph, and microbarovarigraph are recording continuously. Hourly readings are being taken on a nuclear resonance precession magnetometer.

Despite difficulties with an unsatisfactory winch and greatly over-strained cable which twists into snarls upon release of tension, a successful dredging operation was conducted in 1200 fathoms of water; a sample of mud and several rocks were obtained from the ocean floor. About 3,000 feet of over-strained cable was lost in an earlier attempt at dredging when several large snarls developed, one of them involving 2,000 feet of cable. The amount of cable presently on hand will limit operation to 13,000 fathoms. T. J. Herron and R. E. Willie

University of Washington

Micrometeorology - All phases of data collection were carried out for the entire month except the weighing of the evaporation pans. This phase was temporarily discontinued due to falling and drifting snow sufficient to make results worthless. Ice thickness as measured at 6 points within 100 yards of the tower site shows that loss of ice from the ice-water interface had virtually stopped as of 30 October and that ice thickness may be increasing at one site (under a frozen melt-pond). This conclusion must await confirmation by later measurements, however, corroborating evidence is shown by the ice temperature profile.

Snow depths from October 1, although varying considerably due to differences in fall and drift amounts, have shown an average increase of 7.1 cm from 17 stations. Data from the water level recorder indicates when considered along with ice thickness measurements, that the floe has increased in mass by surface addition; this is deduced from an increase in height of the water in the recorder well.

Experimentation is progressing to determine whether summer procedures are universally applicable to winter conditions, particularly in thermocouple circuitry. Solarimeter and photocell measurements are being discontinued due to the sun being well below the horizon. Photocell circuitry could be altered for greater sensitivity, however, the net-radio meter covers this range of intensity for all practical purposes. One photocell is being retained for visible light measurements.

Radiation, air-temperature, and wind data were obtained for about 90% of the month, dead time being due chiefly to recorder maintenance, and de-icing of anemometer cups and bearings. Don Makela

Navigation - Most of the difficulties encountered in navigation on Station Charley were due to low temperature and wind (-20 to -30°C, and 10 knots, resp.); these influence the instrument as well as the observer. Instrumental troubles can be classified among friction in adjustment mechanisms, sluggish level response, sticking of leveling feet, and icing of lenses. Observer difficulties were those of star finding with the instrument's small field, and exposure, primarily of the fingers.

All of the above difficulties have been meliorated by the construction of an enclosed observatory with a rotatory turret. The turret has a plexiglass window through which preliminary sighting may be done, a hinged door permits final theodolite sights to be made in the open air. Some heat is supplied to the theodolite post by means of a heating cable. The instrument is kept thereby in a more tractable condition; no serious thermal effects have been noted. The observatory has additional power outlets, and sound power telephone service to a recorder's desk in the Oceanographic Lab. Star finding with the instrument has become relatively easy by pre-computation of stellar positions.

	<u>October 1, 1959</u>	<u>October 31, 1959</u>
Latitude	77°52.2'N	77°47'N
Longitude	174°04.5'W	171°57'W
Runway Heading	N20.0E	N24.6E

Dan Hale and Austin Post

Oceanography - The winch engine stalled upon attempting to retrieve the new crew's first deep cast. After six attempts four bolts of the final drive sheared, these were replaced by huskier hardware. The engine was then discovered to be running on only one cylinder; the second cylinder was brought in by removing an apparently extraneous wire from the ignition system. The cast was then retrieved, but not smoothly. Upon attempting a bathythermograph measurement the engine blew oil and gas out the crankcase filler tube. The crankcase was found to be flooded with gasoline. The oil was changed, only to find after 50 minutes operation the crankcase again flooded with gas. It was correctly surmised that this was due to a ruptured fuel pump diaphragm, fuel pump was removed - engine now operated on gravity feed. However engine still seemed too unreliable to trust with a deep cast. Further investigation revealed that the lifter of the points was sticking whenever the engine became hot. After remedying this, performance was further improved by the fabrication of a sensitive, manually operated, throttle - this being felt to be more practical now than attempting to overhaul the faulty governor system.

BT 5015A suffered a shift in calibration, apparently due to its being placed inadvertently too close to a Herman Helson heater outlet.

The oceanographic chemical lab narrowly avoided utter catastrophe by freezing due to the belated discovery of stove failure at night. Frantic removal of most glass containers and apparatus held breakage to a minimum; but was not in time to prevent the fracture of the special stopcock plug for our one self leveling burette. Without replacement for this plug, oxygen analyses can be carried through to only about half the accuracy previously possible. We recommend the supplying of plastic containers and apparatus to polar labs wherever feasible.

Dan Hale and Austin Post

Sea Ice Petrofabrics - A universal-stage study of twinning in single ice crystals with zero brine content has been initiated. When photographic equipment now on order is received, a largely photographic and U-stage examination of ice textures and fabrics will be undertaken. Routine examination of properties of this winter's addition to the floe will be commenced when freezing at the bottom of the ice begins. Charles Knight

University of Washington
Dept. of Meteorology and Climatology
Seattle, Washington

Prepared
Station Charley
November 5, 1959

THULE

John A. Jones, Senior AGS Representative

September 7 - November 15, 1959

Aurora and Airglow - Operation of the All-Sky Camera and Patrol Spectrograph commenced September 15, 1959. Although the equipment was operative, data was not taken until October 1, 1959. Visual aurora was observed October 2, 1959 from 0315Z to 0410Z. A new timer was installed in the All-Sky Camera, which now allows more flexible time programming. Data is taken each day from 2300Z to 0900Z. Otherwise, the operation is continuing on a normal, uninterrupted basis.

Radio Wave Absorption - The operation of the project has been continuous except during the period September 21-27, 1959. The receiver was "peaked up" and the front end tubes replaced on the riometer. Difficulties were encountered, but these were corrected and continuous operation resumed.

Satellite Electron Density Measurements - This program has been in continuous operation until the period of September 28 to October 4, 1959, during which time the operation of the Ampex Tape Recorder was discontinued due to lack of information from the satellites.

Sub-Audio Geomagnetic Fluctuations - This project has been successfully operated. During the period September 7 to September 13, 1959, a ten-foot wall of dirt was placed around the detector shack for wind protection. The recorder now makes virtually no response to wind. Data was lost from 0400Z to 1700Z, September 18, 1959, due to a burned resistor in the Dressen Barnes power supply. During the period September 21 - 27, 1959, there was a 24-hour shutdown for extensive equipment changes. Subsequent to this shutdown the equipment was placed in operation. During the period October 19 - 25, 1959, the Kiethely Electrometer was replaced by a "homemade" feed back amplifier because of the electrometer's failure to hold a "zero position." The 2,000 feet of lead-in for the vertical detector loop was placed in three feet of snow during a warm period in the sub-zero weather. During the period November 2 - 8, 1959, the timing was changed to run directly from the "Norman Clock" system. As a result, the relay-bounce has been eliminated. During the period November 9 - 15, 1959, the vertical pick-up loop was placed in the field below the site. The loop is 100 feet by 100 feet.

Cosmic Ray Monitor - Although the Meson Telescope is operating, there have been operational difficulties which will soon be resolved by having John A. Jones visit the University of Maryland during the month of December 1959. It is planned that a new device called a Scintillator Cosmic Ray Monitor will be installed at Thule. This equipment consists of a very large block of plastic scintillator with appropriate circuits. The monitor will serve as a back-up for the more detailed cosmic telescope now in operation.

Neutron Monitor - On September 1, 1959, in accordance with arrangements made with Dr. Pomerantz, our personnel assumed responsibility for the neutron pile. The operation has been very satisfactory to date.

Satellite Recordings (Space Track) - This has been a successful and continuous operation using convertors, receivers, and recorders. During the period October 5 - 11, 1959, alterations were made to the equipment to allow tracking of 1959 IOTA. As of October 31, the 1958 Delta II has not been heard from.

Satellite Tracking for Discoverer Program - During the period September 7 - 12, 1959, seven 1959 Zeta passes were recorded and analyzed; nine 1959 Zeta passes were recorded, but were too weak to analyze; three 1959 Delta passes were recorded. During the period September 14 - 20, 1959, twelve 1959 Zeta passes were recorded and analyzed; no 1959 Delta passes were recorded since it was not in the line of site during that period. During the period September 21 - 27, 1959, ten passes of the Zeta were strong enough to be analyzed. To aid in tracking, a gimbal-mounted counter-poise antenna was constructed by Mr. Sawyer. This has been most successful. Our group is now using this antenna and the twelve-element yagi. The turnstile antenna is presently serving as a curtain rod. The 1959 Delta transmitter seems to be dead since it was not heard from during this period. During the period September 28 - October 4, 1959, all of the satellites mentioned above were silent. This has been true through to the period October 26 - November 1, 1959. During the period November 2 - 8, 1959, the 1959 Kappa was launched (November 7, 1959). Revolution 4 was recorded and analyzed. Revolutions 5, 6, 7, and 8 were also recorded and analyzed. At least two analyzed passes per day are now being forwarded to the interested personnel. During the period November 9 - 15, 1959, twenty-two 1959 Kappa passes were tracked and analyzed. Data from twenty of these passes were forwarded to Space Track Control Center.

General - We are now in the process of studying the feasibility of new field site locations. The Commander of the 4083rd Communications Squadron has placed our Thule field site on the list of authorized users of SAC single side-band communications network.

Miscellaneous

A-Sub Discovers Undersea Plateau in Arctic; Odd Forms of Life Found

New York, Nov. 16 (AP) - A huge underwater plateau has been charted 900 feet below the surface of the Arctic Ocean. The area was discovered by the nuclear submarine, Nautilus, on its pioneering cruise across the Arctic. Columbia University scientists found the top of the submerged plateau to be 14,000 square miles in area. That is 635 times the size of Manhattan and larger than Maryland or New Jersey. The plateau is 500 miles north of the tip of Siberia. The scientists made their study from a floating ice island (Alpha II), which drifted across the entire width of the submerged land mass. "The ocean bottom suddenly leaped from 9000 feet to 900 feet in little more than one day's time - or about 4½ miles of drift," said William J. Cromie, geophysicist. Cromie and three fellow scientists from Columbia's Lamont Geological Observatory found that the shallower waters of the plateau provide an oasis of activity in the dreary Arctic. There was little or no life on the ocean bottom, but on the plateau, several varieties of life were found and photographed: sponges a few inches thick, a cold-water shrimp, small fish and sea anemone. The scientists also found a deposit of fossils, dead 10,000 years or more, of clams and snails. They also trawled along the top of the plateau, reaching near the surface for samples of underwater life. Nothing survived the long haul to the surface. One of the strange specimens picked up by trawling was a 2-inch tadpole-like creature, shaped like a teardrop. It had a large blue eye on each side. Trawls also picked up flat worms, a mosquito-like creature, starfish and jellyfish. (Washington Post, Nov. 17, 1959)

Terrestrial Sciences Laboratory
Geophysics Research Directorate
Air Force Cambridge Research Center, ARDC
L. G. Hanscom Field, Bedford, Mass.

October 1959

Progress Report
Field Program - August - September 1959

Arctic Terrain Research
Project 7628

Ellesmere Ice Shelf, Northwest Territory, Canada

Investigations on the Ellesmere Ice Shelf in the vicinity of Ward Hunt Island were in continuation 1 August 1959, including observations on meteorology, micrometeorology, glaciology, and hydrology.

The meteorological and micrometeorological observations taken were described in the June-July progress report and were continued until midnight of 8 September. These observations were made on the ice rise at a station located about three miles north of Ward Hunt Island. A satellite station was maintained on the ice shelf three-fourths of a mile north of the base meteorological station and was serviced daily until two large deep ponds formed between the meteorological stations after which visits were made at longer intervals. A meteorological station was set up on Ward Hunt Island after 9 September and three daily synoptic meteorological observations are now being obtained.

Early in August an arduous trip was made to the re-entrant area at the northeast edge of the ice shelf where thermopiles and ablation stakes were installed. It was while on this trip that Mr. Paul Walker, the glaciologist, first became afflicted with a serious illness.

The glaciologic program was continued by completing surveys and making routine observations on the program begun by Mr. Walker who was removed 10 August for hospitalization. Remaining members of the team continued to collect ablation data on the 70 station grid, the 35 station survey line west of Ward Hunt and the 4 station re-entrant survey line. Thermopiles have been installed on the grid and both survey lines to depths of about ten feet and temperature readings were continued at these locations. A thermopile set deep in the ice by members of the 1954 party was located and temperature readings were obtained. A survey was made of the grid topography, elevation and location of each of the 70 grid ablation poles were determined, and a survey line was extended to a point of bedrock on Ward Hunt Island. Levels were run from this reference point to the water surface in the moat immediately north of Ward Hunt Island and subsequently referenced to tidal datum. Surface elevations were obtained at one foot intervals between poles set at a site on the ice rise and similar elevations were obtained for sites on the shelf to study surface changes, provided the lines are resurveyed in future years. Other glaciological investigations which had been planned were cancelled or postponed depending upon available time of personnel remaining at the site.

Hydrologic investigations were conducted from 3 July, when surface water first appeared, until 16 August, when melting had ceased. Two drainage basins on the ice rise were studied to determine daily volumetric runoff, daily ice and snow ablation at eight aluminum poles set in one of the drainage basins, and the size of each drainage area. Staff gages were set in four ponds between the main meteorological station and the satellite station but data collection at two of these ponds was discontinued when strand cracks developed and the water ran out early in the season. Similarly a site on the ice shelf had also been chosen and a recording gage was installed but the ponded water also ran out through a strand crack early in the season. Several water samples, to be analyzed for chemical constituents, were obtained from the shelf, the rise and the moat.

About a month of recorded tidal information was obtained at four sites around Ward Hunt Island. Three recorders were available of which one was installed in the moat, one in Disraeli Bay and the third gage was moved from the west end of Ward Hunt Island to the east end after two weeks operation. This tidal information will assist in determining sea level datum since it was impossible to tie survey elevations to the Arctic Ocean at the north edge of the ice shelf because the pack ice remained continuously against the shelf for miles out during the entire summer.

Seismic studies were started in August along the survey line 11 miles west of Ward Hunt Island. Numerous transportation difficulties slowed and curtailed these studies; however, additional seismic data are to be obtained this fall.

Surveys of the earth's magnetic field were made at sites on Ward Hunt Island, along the survey line west of the island and on the grid.

Heavy snow storms near the first of September curtailed some of the work but provided a suitable surface for landing the USAF C-130 ski-equipped-aircraft No. 50021. The first landing after the melt season was made on a marked runway on the ice rise on 12 September with a full load of supplies and equipment. Two additional landings were made on 14 September and a final landing was made on 15 September. Five members of the Ellesmere Ice Shelf field party were returned to L. G. Hanscom Field on 17 September

Three members of the original party and six NCEL personnel are completing the fall program to be concluded in November.

Ice-Free Land, Greenland

Polaris, Northwest Greenland - The following personnel arrived at the Polaris Promontory site on 7 August via the U. S. Coast Guard Icebreaker WESTWIND; Mr. S. M. Needleman, AFCRC; Mr. C. E. Molinaux, AFCRC, Mr. A. H. Joseph, U. S. Army Corps of Engineers Waterways Experiment Station; Lt/Col M.A. Wiener, Hq. NORAD; and Dr. Ankre Weidick, Danish Scientific representative.

Four personnel and 7000 lbs. of equipment were flown to the site by a vessel-based H-19 type helicopter. Mr. Needleman and Capt. Klick drove the light tractor overland about 20 miles to the site. Soil test studies, surface grading and in place strip markings were accomplished.

Preparation of a 5,000 foot gravel airstrip with 500 foot overruns were completed by 12 August but snow and very low ceilings postponed AFCRC C-130 test landings until 15 August.

An emergency landing on the strip took place successfully in the morning of the 15th to rescue Dr. Weidick who had suffered a ruptured appendix. Test landings were executed perfectly during the afternoon of the same day. Col. Ireland, Deputy Wing Commander, 4083 Strategic Wing, Thule Air Base and Commander A. K. Edvars RDN, Danish Liaison Officer at Thule observed the operations.

The party and equipment, as well as a recovered jeep and tractor, were evacuated to Thule Air Base at 1900 hours, 15 August. This concluded successfully the mission objectives of Groundhog I.

East Coast, Greenland - The East Coast party arrived at Kulusuk on the east coast of Greenland at the end of July on the icebreaker USS ATKA. One attempt was made to steam to Scoresby Sund, but was abandoned because of heavy polar pack ice along the coast and the commitment of the ATKA to ice escort duty for supply ships at Kulusuk. Mr. Ole Skaerbo, Civil Engineer of the Greenland Technical Organization, came aboard at Kulusuk to join the East Coast party as Scientific Representative, Mr. Hans Christiansen, Director of the Royal Greenland Trade Department, had come aboard earlier, off Godthaab, and Mr. Eske Brun, Permanent Secretary to the Ministry of Greenland, also came aboard at Kulusuk. Rounding out the Danish contingent was Dr. Helge Larsen, Director of the Danish Arctic Institute, and Danish Scientific Representative for all of Greenland.

After spending nearly two weeks at Kulusuk, the party reached Scoresbysund and immediately went ashore to set up an unprepared airstrip for the Ministry of Greenland at Kap Tobin. Several days were spent laying out a strip, making a topographic map, mapping the geology of the site, and doing soils tests. Several other sites in the vicinity of Scoresbysund were investigated. The best site, in the valley of the Jaette (Jaettedal site), is 1500' long, 100' wide, and has been tested by a Dornier 27 owned by the Nordic Mining Company.

Geologic teams were flown ashore in two HUP-2 helicopters from the ATKA for ground and air reconnaissance of numerous sites that had been chosen previously from air photos by the U. S. Geological Survey. A reconnaissance of Jameson Land, the Schuchert Elv, and Milne Land revealed no suitable long, unprepared runway sites. A similar situation prevailed in north Jameson Land and along the fjords north of the Liverpool Kyst; numerous small airstrips suitable for light planes were found however.

A naval PBY took one member of the party on a reconnaissance flight from Mesters Vig to Hochstetters Foreland. The original plan was to fly to Saelsø to determine the suitability of the lake for a PBY landing and general suitability of the proposed Germania Land airstrip for intensive site studies. The threat of fog at the PBY's base at Mesters Vig cut the flight short just north of Shannon Island.

In the journey from Kulusuk to Scoresby Sund to Mesters Vig in Kong Oscars Fjord, the ATKA sustained serious ice damage to her hull and lost a blade off her port screw. Because of the lateness of the season, the extremely heavy polar ice this year, and the damage to the ship, the Captain cancelled any hopes of a northern penetration. The only work the ATKA could promise was transportation of the East Coast party up the inner fjords to Mackerzie Bay, where the group could do an intensive site survey of the Stordal site between the heads of Loch Fine and Musk Ox Fjord.

Air reconnaissance of sites on Traill Island, Lyells Land, Geographical Society Island, Ymers Island, and Hold with Hope was carried out on the journey to Mackenzie Bay. A party of eight men was ferried by helicopters from the ATKA at Mackenzie Bay to the Stordal site on 31 August, and four of the party returned on 1 September. The remaining four men stayed at Stordal until 7 September.

The Stordal party was handicapped by heavy, wet snow that arrived on 2 September and remained until they were flown out. In spite of adverse weather conditions, the party successfully surveyed a potential airstrip 11,600' long and 500' wide, with 500' overruns at each end. Preliminary soils investigations show that the site is situated on a large terrace composed of sandy pebble and cobble gravel and the surface is underlain by a layer of fine sand from 6" to 3' thick. This fine sand, probably of wind-blown origin, reduces the bearing strength of the airstrip, and may preclude the use of the Stordal site as an unprepared strip.

The East Coast party left Mesters Vig, where they were guests of the Nordic Mining Company, on 10 September and arrived in the States on 11 September.

The mission of Groundhog III (1959) was partly successful. Air reconnaissance was carried out on the ice-free land from Kap Tobin to Hold with Hope. Within this area, twenty-four sites previously selected by the U. S. Geological Survey were visited by helicopter. Many of these sites were further investigated on the ground. Four unprepared strips in the vicinity of Scoresby-sund were evaluated. Preliminary studies at the Stordal site showed little promise. Major sites previously recommended by the Geological Survey and here removed from further consideration include Kap Stewart, Curreholm, Nordost Fjord, and Ostersletten.

Arctic Ocean

Fletcher's Ice Island, T-3 - Scientific observations during August and September were a continuation of those in progress at the beginning of the summer.

It was noted, with considerable interest, that rapid rotation of the island which commenced with the melting of surrounding pack ice continued throughout the summer. At one period in August a clockwise rotation of 25° per day was reported. During the month of September, the total rotation was approximately 360°.

Surface temperatures recorded averaged 37.5°F in August and 26°F in September with a high of 39° in August and a low of 5° in September.

Seismic ocean depths ranged between 1700 and 4000 feet in August and reached a maximum of 6092 feet in September.

On 2 September the icebreaker USS STATEN ISLAND anchored at T-3 for several hours. The craft's captain was flown by helicopter to the T-3 camp for a two hour visit. On departure, two personnel of the scientific complement at the ice island accepted an invitation to travel aboard the ice breaker as far as Point Barrow.

On 28 September, the ice island was located at 71°14.5'N, 137°43.5'W

Station Charlie - Jointly sponsored operations at Station Charlie included meteorological observations by the U. S. Weather Bureau, and long range sound transmission studies by the U. S. Navy Underwater Sound Laboratory. The U. S. Navy Hydrographic Office continued relative ice motion studies and ice surface phenomena. Oceanographic and micrometeorological studies were carried out by the University of Washington for the Office of Naval Research.

Studies sponsored by the Air Force Cambridge Research Center included seismic reflection and refraction observations, and submarine geology investigations. In addition, a precision depth recorder was used to register ocean depth and bottom configuration. A continuous record of atmospheric pressure variation was made by a microvariobarograph and a magnetometer was operated continuously.

AFCRC investigations were conducted by the Lamont Geological Observatory under contract.

Mt. Chamberlin - Arctic Coast, Alaska

Lake Peters - Mt. Chamberlin Area - During the first two weeks in August limnological investigations were conducted from a boat on Lake Peters. These investigations were essentially the same ones carried out earlier in the season on top of the ice, but the operations were much easier from a boat. Also during this period, bottom samples were obtained and investigations carried out on a small nearby lake. Both lakes were sampled with an Eckman Dredge and the biological specimens preserved for later study. In a small lake in the moraines north of Lake Peters temperatures, optical properties and biological productivity were measured.

Meteorological investigations were continued until 27 August on the same scale as for June and July.

An Air Force helicopter transported food and fuel to the Chamberlin Glacier camp for future glaciological investigations. Throughout the summer the camp supported not only the basic program, but also was used by transient investigators working in the area.

The station was closed in late August after equipment and supplies were cached in the permanent buildings.

Arctic Coast, Alaska - On July 27, USGS Geologists Lewis and Chase were airlifted by the Arctic Research Laboratory Floatplane from Barter Island to the Canning River near Shublik Springs to continue mapping surficial materials of the arctic foothills. From 27 July to 7 August the party moved down the Canning by canvas boat to a point about 5 miles north of the Sadlerochit Mountains and made foot traverses from four separate camps. Poor weather during this period greatly limited field work. On 8 August camp was disrupted by a flash flood, and on 12 August the party was evacuated by a Union Oil Co. helicopter based at Lake Schrader. Owing to continued bad weather field work was not resumed for two weeks. Because of illness in his family, Chase left the field in late August. On 27 August, Lewis and an assistant provided by the ARL were flown to a small lake near Tamayariak Creek for a three-day stay. A stretch of poor weather delayed evacuation from this lake until 7 September at which time the field season was terminated.

The chief results of the August and September field work was the delineation of two glaciations in the Canning River area. During the older glaciation, ice moved down the valley of the Canning and spread out around the front of the Sadlerochit Mountains in a large piedmont lobe that extended east to Tamayariak Creek and north to within 10 miles of the present coastline. This represents the farthest northern extension of glaciation in Alaska. Fresher glacial deposits mark a younger glaciation during which a glacier, more or less confined to the valley of the Canning, moved to within 15 miles of the present coast

Operational Applications

Various studies of sea ice solidification, snow and ice comminution and compaction, ice structure and effect of additives, and the strength and deterioration of ice were conducted at the Climatic Laboratory, Eglin Air Force Base by personnel of our contractor, Arctic Institute of North America. This work continued and supplemented the previous Pt. Barrow studies.

The research data are currently being analyzed, but preliminary results indicate that the thin layer flooding and melting techniques produce ice of superior qualities, the processing of very fine grain snow or ice produces excellent compaction properties, and the addition of a small amount of fiberglass to freezing ice increases its strength by a factor of 100. Detailed results and their significance to scientific production of ice and snow structures will be presented as soon as possible.

During the period contractor personnel of AINA conducted studies of the physical and elastic properties of ice at the facilities of the Navy Electronics Laboratory, San Diego, California. Data are presently being analyzed and results will be presented when available.

Research contracts have been initiated for: 1) the theoretical study of physical and chemical methods for developing improved processes, properties and uses for ice and snow as engineering materials, to be conducted by the Massachusetts Institute of Technology; and 2) a feasibility study of the protection and preservation by foamed additives of ice and snow airstrips from heat absorption, erosion and melting caused by solar radiation, to be conducted by Onondaga Associates, Inc.

INTERNATIONAL

USSR

Severnny Polyus-6 To Be Abandoned

It is planned to evacuate the staff members of the station Severnny Polyus-6 by plane at the beginning of October, when the ice floe is expected to be located 1,000-1,100 kilometers west of Zemlya Frantsa Iosifa. One of the powerful Soviet icebreakers will also be located in this area to assist in the operation. In addition, a hydrological expedition aboard the schooner Shtorm will patrol along the ice edge in the northern part of the Greenland Sea, beginning with the end of September; this expedition will be headed by V. A. Shamont'yev, scientific associate of the Arctic and Antarctic Institute.

The station Severnny Polyus-6 has been in operation for almost 4 years and has traveled about 3,000 kilometers in a general direction. It has crossed the ocean from the Bering Strait to the Greenland Sea. A large amount of scientific material has been collected, which has contributed a great deal to available information on the nature of the Central Arctic Basin. ("The Drift Is Becoming Dangerous, Moscow, Sovetskiy Flot, 30 Aug 59).

Evacuation of Severnny Polyus-6 Begins

According to radiograms received by the Arctic and Antarctic Institute from station Severnny Polyus-6, the evacuation of equipment from the ice floe has begun. It has decided to leave one of the huts, food supplies, some equipment, a cylinder with gas, and household items. A letter will be left behind under glass on the table in the hut, written in Russian and English and reading as follows: "Dear travelers! Soviet polar workers of the station Severnny Polyus-6 lived and worked in this hut in the name of science for 3½ years. In abandoning the ice floe, we are leaving behind this hut with a supply of food and other items which may be vitally necessary to some travelers. We would be glad if our hut would serve as a shelter, the food supplies would sustain your strength, and the fire give you warmth. We wish you, unknown travelers, success and good luck." ("In Abandoning the Ice Floe," Moscow, Izvestiya, 12 Sep 59).

Severnny Polyus-8 is Contacted By Plane

For several months after the station staff members of the drift station Severnny Polyus-8 were left on the ice floe, contact with them was maintained by radio only. Not a single plane was able to make a landing on the drifting ice during the summer.

The summer months gave the station staff a great deal of trouble. The snow around the huts melted, and the men found themselves on an ice foundation, about 1.5 meters high, from which they expected to slide off any minute. To save the equipment, the station site had to be moved to a safer place on the ice floe. However, scientific research work continued according to plan.

Not until early September did an IL-14 plane, piloted by Baranov, drop mail on Severnyy Polyus-8. Several days later, an LI-2, piloted by Pozdnyakov, made several experimental flights, with a landing on Severnyy Polyus-8. The plane delivered mail, fresh meat, bread, fresh potatoes, onions, new motion picture films, and various types of equipment and materials. ("Airplane Lands on SP-8," Moscow, Vodnyy Transport, 26 Sep 59)

Severnyy Polyus-8 Supplied for Winter Season

A. D. Il'in, Polar Aviation pilot, completed the last supply flight in 1959 to the drift station Severnyy Polyus-8. The polar scientists at this station now have sufficient supplies of food, fuel, scientific equipment, and other materials, to last until next spring. ("Yesterday at SP-8": Moscow, Vodnyy Transport, 20 Oct 59).

Oceanographic Expedition Returns

The oceanographic expedition of the Arctic and Antarctic Institute, which had been conducting research from the hydrographic ship Azimut, returned to Leningrad on 20 October.

According to expedition chief, V. A. Vedernikov, Candidate of Geographical Sciences, the expedition took about 3 months. For the first time, complex oceanographic research was conducted during the summer season in the most difficult sector of the Northern Sea Route, i.e., Proliy Vil'kitskogo, connecting Kara Sea and Laptev Sea. In this area, difficult ice conditions usually obstruct the passage of ships.

Soviet-designed buoy stations, which automatically record the direction and speed of currents, operated in this area during the whole navigation period for the purpose of hydrological research. The data thus obtained will help in the preparation of navigational aids for polar navigators.

In addition to associates of the Arctic and Antarctic Institute, a group of associates of Leningrad University and of the Higher Maritime Engineering School imeni Admiral S. L. Makarov took part in the expedition. ("Azimut Returns to Leningrad": Moscow, Vodnyy Transport, 22 Oct 59).

Changes in Arctic Climate

The newspaper Komsomol'skaya Pravda requested the opinions of several scientists, including L. A. Chubukov, Doctor of Geographical Sciences; V. R. Dubentsov, head of one of the divisions of the Central Bureau of Weather Forecasts, and others, regarding recent changes in the climate.

According to meteorological observations, a certain warming of the climate is taking place at this time. Numerous facts have proved this. During the past 100 years, the average yearly temperature in Leningrad has risen by more than one degree, which corresponds to the whole city being moved 600-700 km to the south. The warming trend is especially noticeable in the Arctic, where islands of frozen soil and ice are melting. Ostrov Vasil'yevskiy has melted and only an underwater bank has appeared in its place. Ostrov Semenovskiy previously had a length of 15 km; now it is only one kilometer long. Lyakhovskye Ostrova are melting like sugar in a glass of water. Glaciers are rapidly retreating everywhere. French scientists have claimed that the glaciers in Greenland are decreasing by 100 cubic meters per year.

On the basis of current data, one cannot speak of any abrupt changes in climate. The warming process is not consistent throughout. For example, in North America the glaciers retreated up to 1943, while they are now once more increasing. The general rate of temperature increase has slowed down since 1940. . . . ("A New Ice Age?" Moscow, Komsomol'skaya Pravda, 26 Jul 59)

ARCTIC RESEARCH LABORATORY
 POINT BARROW, ALASKA
 Operated By
 University of Alaska
 Under Contract
 With
 Office of Naval Research

PROGRESS REPORT FOR THE MONTH OF JUNE 1959

ARL STAFF:

Brewer, Max C.	Director
Tietjen, Paul	Administrative Assistant
Fischer, Robert	Chief Pilot
Franklet, George*	Field Assistant
Harding, James	Administrative Aid
Main, Robert	Pilot
O'Sullivan, Kathleen	Secretary
Stephens, Donald (Part-time)	Scientific Technician
Talbert, Frank	Shop Foreman
Thomas, Charles	Supply Specialist
Adams, Baxter*	Carpenter
Ahaglik, Roger	Painter
Agheak, Joe	Laborer
Akpik, Frank	Laborer
Brower, Harry	Carpenter
Hopson, Edward	Carpenter
Itta, Harold*	Carpenter
Lampe, Chester	Carpenter
Solomon, Merle*	Custodian - Field Assistant
Sovalik, Pete	Guide - Custodian
Toovak, Kenneth	Equipment Operator
* Temporary Employees	

INVESTIGATORS AND ASSISTANTS:

Beal, M. Allan	Sea Valley and Tide Studies	Scripps Inst. Oceanography
Beal, Phyllis	Sea Valley and Tide Studies	Scripps Inst. Oceanography
Stephens, Donald	Sea Valley and Tide Studies	Scripps Inst. Oceanography
Bengaard, Hans	Ionospheric Research	N.B.S.
Simmons, Abe	Ionospheric Research	N.B.S.
Campbell, Dr. John	Archaeological Reconnaissance	Yale University
Fallingstad, Thomas	Archaeological Reconnaissance	Yale University
Gubser, Nicholas	Archaeological Reconnaissance	Yale University
*Church, Dr. Phil E.	Sea Ice Micrometeorology	University of Washington
Ditzler, Robert	Sea Ice Micrometeorology	University of Washington
Makela, Donald	Sea Ice Micrometeorology	University of Washington
Post, Austin	Sea Ice Micrometeorology	University of Washington
Fisher, Dr. Alton K.	Oxygen Consumption of Tissues	State Univ. of Iowa
de Shazer, Dr. Douglas	Oxygen Consumption of Tissues	State Univ. of Iowa
Walters, Victor	Oxygen Consumption of Tissues	State Univ. of Iowa
Wise, Stanley	Oxygen Consumption of Tissues	State Univ. of Iowa
*Elvey, Dr. Chris	Aurora and Earth Potential	Geophysical Inst., U. of A.
Baumgartner, Tom	Aurora and Earth Potential	Geophysical Inst., U. of A.
Hessler, Dr. Victor	Aurora and Earth Potential	Geophysical Inst., U. of A.

INVESTIGATORS AND ASSISTANTS - Continued:

Geist, Dr. Otto	Arctic Paleontological Studies	University of Alaska
Aiken, Louis	Arctic Paleontological Studies	University of Alaska
Schallock, Eldor	Arctic Paleontological Studies	University of Alaska
Sellman, Paul	Arctic Paleontological Studies	University of Alaska
*Holmes, Dr. G. W.	AFCRC Lake Peters Project	AFCRC, U.S.G.S.
Barnes, David	Strength of Melting Ice Sheet	AFCRC, U.S.G.S.
Clarke, Ellsworth	Field Assistant - Peters Lake	AFCRC - AINA
Hobbie, John	Limnological Studies	AFCRC - AINA
Leavitt, Frank	Strength of Melting Ice Sheet	AFCRC - AINA
Moore, David	Field Assistant - Peters Lake	AFCRC - AINA
Mueller, Edmund	Field Assistant - Peters Lake	AFCRC - AINA
Riddell, Frank	Lake Peters Camp Manager	AFCRC - AINA
Rock, Pvt. Carroll	Micromet Studies	AFCRC
*Hussey, Dr. Keith	Geologic and Geomorphic Invest.	Iowa State College
Carson, Charles	Oriented Lakes	Iowa State College
Michelson, Ronald	Geologic and Geomorphic Invest.	Iowa State College
O'Sullivan, John	Geologic and Geomorphic Invest.	Iowa State College
Lewis, Charles	Geologic Mapping	AFCRC, U.S.G.S.
Chase, Livingston	Geologic Mapping	AFCRC, U.S.G.S.
Spetzman, Lloyd	Botanical Survey	AFCRC, U.S.G.S.
Maher, William	Ecology of Jaegers	University of California
Meyer, Ardo	Magnetic Observatory	USC & GS
Myres, Timothy	Behavior of Eider Ducks	U. of B.C.
Daniels, Mike	Behavior of Eider Ducks	U. of B.C.
*Petrie, Harry	Auroral Propagation Studies	N.B.S.
Workman, John	Auroral Propagation Studies	N.B.S.
Peyton, Harold	Structural & Mech. Prop. of Ice	University of Alaska
Nathanson, Stephen	Structural & Mech. Prop. of Ice	University of Alaska
Peyton, Patricia	Structural & Mech. Prop. of Ice	University of Alaska
Pitelka, Dr. Frank A.	Ecology of Lemmings	University of California
Cade, Dr. Thomas	Ecology of Lemmings	University of California
Childs, Dr. Henry	Ecology of Lemmings	University of California
Holmes, Richard	Ecology of Lemmings	University of California
Porter, Stephen	Mapping of Pleistocene Geology	Yale University
Hall, Edward	Mapping of Pleistocene Geology	Yale University
Perry, Kenneth	Mapping of Pleistocene Geology	Yale University
Saltsman, Hugh	NPR-4 Oil Field Inventory	U. S. Navy
Harding, Linda	NPR-4 Oil Field Inventory	U. S. Navy
Sole, Nelson	NPR-4 Oil Field Inventory	U. S. Navy
Sater, John	Sea Ice Photography	AINA
Schalk, Dr. Marshall	Beach and Near Shore Studies	Smith College
Hume, Dr. James	Beach and Near Shore Studies	Smith College
Shanks, Dr. Royal	Tundra Vegetation Studies	University of Tennessee
Koranda, John	Tundra Vegetation Studies	University of Tennessee
Sovalik, Phillip	Arctic Ice and Permafrost	USGS
Swade, Richard	Activity Habits of Arctic Animals	Princeton University
Tedrow, Dr. John	Pedologic Investigations	Rutgers University
Balloni, Fiorenzo	Pedologic Investigations	Rutgers University
Brown, Jerry	Pedologic Investigations	Rutgers University
Douglas, Lowell	Pedologic Investigations	Rutgers University
*Toman, Dr. Kurt	VHF Transmission	AFCRC
Boatz, Kenneth	VHF Transmission	AFCRC
Four AF Enlisted Men	VHF Transmission	AFCRC

* Not at ARL during month.

ARRIVALS:

2 June	Michelson, Ron Sovalik, Pete Myres, Timothy Daniels, Mike	Geologic and Geomorphic Invest. ARL Staff Behavior of Eider Ducks Behavior of Eider Ducks	Iowa State Univ. Inaru River Inaru River Inaru River
3 June	Brewer, Max C. Fischer, Robert	DARL ARL Staff Pilot	Lake Peters Lake Peters
4 June	Pitelka, Dr. Frank Holmes, Richard Harding, James Harding, Linda Kyriazopoulos, Dr. Basil	Ecology of Lemmings Ecology of Lemmings ARL Staff NPR-4 Inventory University of Salonika	Univ. of California Univ. of California Fairbanks, Alaska Fairbanks, Alaska Fairbanks, Alaska
6 June	Myres, Timothy Daniels, Mike Carson, Charles Clarke, Ellsworth Moore, David Swade, Richard	Behavior of Eider Ducks Behavior of Eider Ducks Oriented Lakes Field Asst. - Lake Peters Field Asst. - Lake Peters Activity Habits of Arctic Animals	Colville River Colville River Iowa State College AINA AINA Princeton Univ.
8 June	Cromie, William Krytchel, Henry	Lamont Geophysical Observatory Lamont Geophysical Observatory	Fairbanks, Alaska Fairbanks, Alaska
9 June	Mueller, Edmund Barnes, David	Field Asst. - Lake Peters Strength of Melting Ice Sheet	AINA Lake Peters
10 June	Douglas, Lowell Brown, Jerry	Pedologic Investigations Pedologic Investigations	Rutgers University Rutgers University
11 June	Porter, Stephen Brewer, Max C. Tietjen, Paul H. Harding, James Boatz, Kenneth Four AF Enlisted Men	Mapping of Pleistocene Geology DARL ARL Staff ARL Staff AFCRC, VHF Transmission AFCRC, VHF Transmission	Yale University Umiat, Alaska Umiat, Alaska Umiat, Alaska Elmendorf AF Base Elmendorf AF Base
12 June	Campbell, Dr. John	Archeological Reconnaissance	Yale University
13 June	Brower, Harry	ARL Staff	Lake Peters
14 June	Main, Robert	ARL Staff Pilot	Fairbanks, Alaska
16 June	Childs, Dr. Henry Geist, Dr. Otto Sellman, Paul Schallock, Eldor Cade, Dr. Thomas	Ecology of Lemmings Arctic Paleontological Studies Arctic Paleontological Studies Arctic Paleontological Studies Ecology of Lemmings	Univ. of California Univ. of Alaska Univ. of Alaska Univ. of Alaska Lake Peters
17 June	Shanks, Dr. Royal Koranda, John Ditzler, Robert	Tundra Vegetation Studies Tundra Vegetation Studies Sea Ice Micrometeorology	Univ. of Tennessee Univ. of Tennessee Station Charlie
18 June	Saltzman, Hugh	NPR-4 Inventory	Fairbanks, Alaska
19 June	Harding, James Agheak, Joe Brewer, Max C.	ARL Staff ARL Staff DARL	Umiat, Alaska Umiat, Alaska Killik River
20 June	Fisher, Dr. Alton K. de Shazer, Dr. Douglas Walters, Victor Wise, Stan Sater, John	Oxygen Consumption of Tissues Oxygen Consumption of Tissues Oxygen Consumption of Tissues Oxygen Consumption of Tissues Sea Ice Photography	State Univ. of Iowa State Univ. of Iowa State Univ. of Iowa State Univ. of Iowa McCall Glacier

ARRIVALS - Continued:

21 June	Tedrow, Dr. John	Pedologic Investigations	Rutgers University
	Balloni, Fiorenzo	Pedologic Investigations	Rutgers University
	Swade, Richard	Activity Habits of Arctic Animals	Pitmegea River
22 June	Douglas, Lowell	Pedologic Investigations	Umiat, Alaska
23 June	Sellery, Dr. Harry	National Bureau of Standards	Boulder, Colorado
	Koch, Wesley	National Bureau of Standards	Boulder, Colorado
24 June	Geist, Dr. Otto	Arctic Paleontological Studies	Umiat, Alaska
	Tietjen, Paul H.	ARL Staff	Umiat, Alaska
	Cade, Dr. Thomas	Ecology of Lemmings	Umiat-Killik-Umiat
	Daniels, Mike	Behavior of Eider Ducks	Umiat-Colville River
	Reiger, Dr. Samuel	U.S. Dept. of Agriculture	Palmer, Alaska
25 June	Shanks, Dr. Royal	Tundra Vegetation Studies	Firth River
	Koranda, John	Tundra Vegetation Studies	Firth River
26 June	Swade, Richard	Activity Habits of Arctic Animals	Umiat, Alaska
	Hessler, Dr. Victor	Aurora and Earth Potentials	Geophysical Inst., U. of A.
27 June	Pitelka, Dr. Frank	Ecology of Lemmings	Pitmegea River
	Maher, William	Ecology of Lemmings	Pitmegea River
28 June	Schalk, Dr. Marshall	Beach and Near Shore Studies	Smith College
	Hume, Dr. James	Beach and Near Shore Studies	Smith College

DEPARTURES:

1 June	Cade, Dr. Thomas	Ecology of Lemmings	Lake Peters
2 June	Merritt, Robert	ARL Radio Consultant	Geophysical Inst., U. of A.
	Shoup, Richard	ARL Radio Consultant	Geophysical Inst., U. of A.
	Hodges, James	AFCRC Radio Project	Stanford Research Inst.
3 June	Brewer, Max C.	DARL	Lake Peters
	Ditzler, Robert	Sea Ice Micrometeorology	Station Charlie
6 June	Myres, Timothy	Behavior of Eider Ducks	Colville River
	Daniels, Mike	Behavior of Eider Ducks	Colville River
	Kyriazopoulos, Dr. Basil	University of Salonika	Fairbanks, Alaska
8 June	Clarke, Ellsworth	Field Asst. - Lake Peters	Lake Peters
	Moore, David	Field Asst. - Lake Peters	Lake Peters
9 June	Mueller, Edmund	Field Asst. - Lake Peters	Lake Peters
10 June	Barnes, David	Strength of Melting Ice Sheet	Fairbanks, Alaska
	Myres, Timothy	Behavior of Eider Ducks	Univ. of B. C.
11 June	Beal, M. Allan	Sea Valley and Tide Studies	Nome, Alaska
	Beal, Phyllis	Sea Valley and Tide Studies	Nome, Alaska
	Stephens, Donald	Sea Valley and Tide Studies	Nome, Alaska
	Brewer, Max C.	DARL	Umiat, Alaska
	Tietjen, Paul H.	ARL Staff	Umiat, Alaska
	Harding, James	ARL Staff	Umiat, Alaska
12 June	Maher, William	Ecology of Jaegers	Pitmegea River
	Swade, Richard	Activity Habits of Arctic Animals	Pitmegea River
13 June	Campbell, Dr. John	Archaeological Reconnaissance	Anaktuvuk Pass
	Porter, Stephen	Mapping of Pleistocene Geology	Anaktuvuk Pass

DEPARTURES - Continued:

14 June	Talbert, Frank	ARL Staff	Nome (new ARL boat)
	Harding, James	ARL Staff	Umiat, Alaska
	Agheak, Joe	ARL Staff	Umiat, Alaska
	Daniels, Mike	Behavior of Eider Ducks	Umiat, Alaska
15 June	Sater, John	Sea Ice Photography	McCall Glacier
	Brown, Jerry	Pedologic Investigations	McCall Glacier
	Toovak, Kenneth	ARL Staff	Nome (new ARL boat)
16 June	Post, Austin	Sea Ice Micrometeorology	Univ. of Washington
	Carson, Charles	Oriented Lakes	Umiat, Alaska
	Douglas, Lowell	Pedologic Investigations	Umiat, Alaska
	Cromie, William	Lamont Geophysical Studies	Station Charlie
	Krytchel, Henry	Lamont Geophysical Studies	Station Charlie
18 June	Cade, Dr. Thomas	Ecology of Lemmings	Umiat, Alaska
19 June	Brewer, Max C.	DARL	Killik River
	Campbell, Dr. John	Archaeological Reconnaissance	Ladd AF Base
20 June	Boatz, Kenneth	AFCRC, VHF Transmission	Elmendorf AF Base
	Four AF Enlisted Men	AFCRC, VHF Transmission	Elmendorf AF Base
21 June	Childs, Dr. Henry	Ecology of Lemmings	Pitmegea River
22 June	Main, Robert	ARL Staff Pilot	Fairbanks-Umiat
	Sole, Nelson	NPR-4 Inventory	Firth River
	Shanks, Dr. Royal	Tundra Vegetation Studies	Firth River
	Koranda, John	Tundra Vegetation Studies	Firth River
	Swade, Richard	Activity Habits of Arctic Animals	Umiat, Alaska
24 June	Geist, Dr. Otto	Arctic Paleontological Studies	Umiat-Killik River
	Tietjen, Paul H.	ARL Staff	Umiat-Killik River
25 June	Reiger, Dr. Samuel	U.S. Dept. of Agriculture	Palmer, Alaska
	Swade, Richard	Activity Habits of Arctic Animals	Umiat-Porcupine L.
	Tedrow, Dr. John	Pedologic Investigations	Umiat-Porcupine L.
26 June	Shanks, Dr. Royal	Tundra Vegetation Studies	Umiat-Killik River
	Koch, Wesley	National Bureau of Standards	Boulder, Colorado
	Sellery, Dr. Harry	National Bureau of Standards	Boulder, Colorado
27 June	Koranda, John	Tundra Vegetation Studies	Pitmegea River
	Pitelka, Dr. Frank	Ecology of Lemmings	Pitmegea River
28 June	Sater, John	Sea Ice Photography	Washington, D.C.
	Akpik, Frank	ARL Staff	Nome, Alaska
	Maher, William	Ecology of Jaegers	Kaolak River
	Swade, Richard	Activity Habits of Arctic Animals	Kaolak River
29 June	Geist, Dr. Otto	Arctic Paleontological Studies	Ikpikpuk River
	Sellman, Paul	Arctic Paleontological Studies	Ikpikpuk River
	Schallock, Eldor	Arctic Paleontological Studies	Ikpikpuk River
	Pitelka, Dr. Frank	Ecology of Lemmings	Umiat, Alaska
	Agheak, Joe	ARL Staff	Ikpikpuk River
30 June	Brewer, Max C.	DARL	Lake Peters

Twenty-five projects operated out of ARL during June. As of 30 June, 43 investigators or staff personnel supporting these investigators were in the field away from Barrow. These personnel were scattered from the Canadian Border along the coast to Nome and inland as far as Anaktuvuk Pass. In order to furnish logistics support the ARL aircraft logged 149 flight hours. Additionally, Wien aircraft were chartered for 13 hours and the Wien Commercial was used to transport 14 personnel between Barrow and Umiat.

Frank Talbert and Kenneth Toovak accepted delivery of the new ARL boat, Natchik, in Nome on 23 June. Natchik, meaning ring seal in Eskimo, is not the official name but was applied to the boat in Seattle because of non-delivery of a telegram. Unless soon changed, however, it is likely to become the official name. After inspection by Dr. Patty, President of the University of Alaska, local officials, and the Queen of Nome's Midnight Sun Festival, the boat put to sea for trial runs and local oceanographic studies with Talbert, Toovak, Beal, and Stephens aboard. At the end of the month, Frank Akpik replaced Toovak and trial runs were being continued.

ARL aircraft 5004E was changed in Fairbanks from skis to floats during the first week of June. Upon completion of this work and the repair of radios badly shaken up during the ocean ice flying program, the plane was based at Umiat where it could operate from a lagoon on the Colville River and service field parties located on rivers or more southerly lakes which were ice free. Aircraft 5006E was retained at Barrow and operated with wheel-skis during the first two-thirds of the month, wheels for the balance of the month.

Fischer landed John Sater and Jerry Brown on the McCall Glacier on 15 June and brought them off on 20 June. Sater wanted to re-set measuring stakes established during the IGY program. The Camp was still in good condition although snow now nearly covers the Jamesway at the Upper Camp located at 8400 feet.

A generous amount of staff assistance was provided in the support of scientific projects during the month. This ranged all the way from providing a Native to hunt seals for Dr. Fisher's project, to providing Native guides to projects (Geist, Myres, Hussey projects), to having a pilot and plane remain with the investigator for short periods, to providing new construction (micromet project at Eluitkak Pass), as well as many construction and repair jobs completed in the shop.

The plant facilities improvement program continued in full swing during the month. This included work begun by PS&D electricians in building 250, in the connection between buildings 250 and 251, and in the greenhouse, all of which were completed this month. We now are able to operate the equipment in the temperature control room and the electric heaters in the greenhouse. Twelve 40-watt fluorescent fixtures were installed in the greenhouse for light during the winter months. The 20 KW of electric heat is more than sufficient to maintain 68 degrees F in the greenhouse during the summer when the steam is turned off. The greenhouse is now in operation although construction of benches and other small improvements remain to be made.

The camp power distribution system had to be beefed up in order to handle the extra 50 KW of power required for the installations in the main Laboratory buildings. A new transformer bank was mounted on poles behind building 250 to handle the load.

Rewiring of building 253 was completed this month. For the first time since the transfer of the building to ARL, there is enough light to see and work by in the building and it no longer presents a fire hazard. All wiring was installed in rigid conduit mounted on furring strips. Lights were also

mounted on the outside of the building and will illuminate the area between buildings 253 and 353 during the winter. About eight man weeks of labor including carpenter assistance and electricians' time was invested in this project. New transformers were installed behind 253 to carry the additional load in buildings 253 and 353. Forty-five man weeks of electricians' time was needed to complete the new electrical work, repairs, and modifications at ARL during the past two months.

A floor of 2x6-inch tongue and groove lumber 12 feet wide and 60 feet long was laid in the carpenter shop side of building 353. The floor was given three coats of paint before the saws and other carpenter tools were moved onto it. Storage shelves were built and one bench was painted. The electricians installed 220 volt 3 phase wiring in the machine shop portion of the building.

Building 351 was completely remodeled for the first time in ten years. The interior of the building was painted, new tops laid on the counters, a new sink and copper plumbing installed, furnishings were repaired and painted, and a new floor laid. The wood on the exterior of the building was given a primer coat and will be given a second coat of paint.

Remodeling work was begun in dormitory building 248. The interior was painted after new doors were hung on all the rooms and patching of the walls completed. The tin sinks were discarded and three new sinks installed. All plumbing is now copper tubing. A new floor has been laid in the front half of the building.

The new 12 x 20-foot building at Lake Peters is completed now except for painting which will wait until material can be shipped in after the ice is off the lake. The building is completely insulated with three inches of fiberglass and also has a vapor barrier seal. Harry Brower, one of the Laboratory carpenters working on the project, was injured while trying to lift a 4x6-foot sheet of 5/8-inch plywood onto the roof of the building by himself. He was immediately evacuated by the ARL ski-wheel plane and is now back at work on limited duty.

One of the Laboratory family units, F-1, is being remodeled. Each of the family units is divided into two apartments suitable for small families. The apartment on the left side was painted and a new floor was laid. The utility room between the two apartments was torn out to make space for a kitchen to be built in the apartment on the right side of the building. The bathroom door from the living room was closed off and, after the bedroom closet was removed, a door from the bedroom to the bathroom was built. We are planning for new copper plumbing in the building and the installation of a new water tank, pump, and electric hot water heater. It will be necessary to rewire the building to provide 220-volt power for the hot water heater and the electric range to be installed in the kitchen.

The last of the details in the construction of the temperature control room were completed. These included touch-up painting and the installation of a masonite floor. The doors were weather-stripped. Now that the refrigerator units have been put in operation, the room is ready for use.

Two more vehicles were repainted this month, one jeep and one of the new weasels. The top on the jeep was completely rebuilt, new front springs and shock absorbers installed, and the front seats were replaced. A new top was put on the weasel.

Miscellaneous work this past month included some picking up outside the ARL buildings after the departure of the snow. A walk-in refrigerator located behind building 351 was blocked up in place and made usable. Three running wheels for squirrels were built and a "dark box" was constructed to house one of the wheels and a squirrel.

The earth auger was operated for seven days during the month drilling holes for the Hussey project and setting piles for a bridge over the PS&D water line.

ARL was pleased to welcome several visitors during the month including Dr. Basil D. Kyriazopoulos, Professor of Meteorology and Climatology, University of Thessaloniki, Greece.

The monthly progress reports for June follow.

SEA VALLEY AND TIDE STUDIES:

The first ten days of June were spent in repairing the equipment used in the ice flying program and in titrating water samples and processing station data. The last of the IGY sea level data was submitted to the World Data Center with appropriate acknowledgments for ONR support of the research.

On 11 June the project leader and assistants departed Barrow for Nome to set up laboratory and storage facilities in preparation for the delivery of the research boat NATCHIK on the 15th. The boat was unloaded from the TALKEETNA on 23 June and moved into the harbor. Two days were spent in loading equipment and building racks for instruments. In spite of severe weather, the boat was worked in Norton Sound on several occasions before the end of the month.

The NATCHIK behaves well in rough seas and her equipment handling arrangements - winch and A frame - are equal to those found on much larger research ships. An underwater camera weighing 200 pounds was easily worked by one man and a winch operator.

(Beal)

IONOSPHERIC RESEARCH:

The vertical Ionosphere soundings project was operated throughout the month with less than 1% loss of scheduled observations.

The final tank circuits of three of the four transmitters for the meteor propagation project were completely rebuilt in order to replace the vacuum capacitors formerly used with a better type. By the end of the month all four transmitters were ready for operation.

IONOSPHERIC RESEARCH - Continued:

On June 13 Mr. and Mrs. Alton O. Crawley arrived in Barrow and were quartered at ARL. Mr. Crawley worked at the station during the balance of the month. On July 3 Mr. Crawley took charge of the station and Bengaard left.

On June 23 Mr. Harry G. Sellery, Chief of Section 85.80, arrived for a four day inspection of the station.

(Bengaard)

ARCHAEOLOGICAL RECONNAISSANCE:

The investigator and assistants arrived in Anaktuvuk Pass on 13 June. A new site, which apparently represents yet another cultural complex for the area, was discovered and partially excavated by the end of the month.

The principal investigator suffered second degree burns on his right hand and wrist on 19 June, when a kerosene stove that mistakenly had gasoline in it exploded. He was flown to Fairbanks for treatment and, as of 30 June, was preparing to return to the field. While in Fairbanks he examined some high ground in the vicinity of Cleary Summit as potential archaeological sites.

(Campbell)

SEA ICE MICROMETEOROLOGY:

Principal activities on this project were directed towards the actual construction of the instrumentation installation. The wanigan which had been taken to the site earlier was set into place and leveled, the 16 meter tower was permanently installed and the mast for over water radiation measurements was set into place. All of the footings for the tower, the mast and the "dead-men" for the guy-wires were identical: an 8-inch diameter hole was augered to at least 7 feet from the surface and the footings or dead-men placed. The tower is bolted to 2"x6' pipe bolted to the bottom with a 3/4"x4'x4' sheet of plywood at the connection. This sheet of plywood is at the permafrost level and was subsequently covered with 16" of loose gravel. There are 4 guy wires, at 3, 8, 12, and 15 meters respectively, from each corner of the tower. These are fastened to the "dead-men" which are eight-foot long pieces of 2" pipe embedded into the permafrost. The mast for radiation measurements is one piece of 4 1/2" drill pipe, 43 feet long set 12 feet into the beach gravel. Two "dead-men" are placed as are those for the tower.

Instrumentation is near completion and it awaits only a permanent 110-volt power supply and the radiation mast for completion.

Considerable data have been recorded and most of the instrumentation has been calibrated or checked for satisfactory accuracy.

SEA ICE MICROMETEOROLOGY - Continued:

Instrumentation thus far installed are: 1. dry bulb air temperature by thermocouples at 7 levels, 2. wind velocity at 6 levels, 3. incoming radiation by both Eppley pyrhelimeter and Beckman and Whitley total radiometer, 4. reflected radiation from sand by the same instrument types as in 3., 5. sand temperatures at 2 cm. and 80 cm., 6. sea water temperature, 7. light penetration through the ice (discontinued because of breaking ice), 8. wet and dry bulb psychrometer readings at least daily.

(Makela for Church)

OXYGEN CONSUMPTION OF TISSUES:

To be included in July report.

(Fisher)

AURORA AND EARTH POTENTIAL:

The Riometer was operated throughout the month with a period of very high absorption.

The Auroral radar was operated throughout the month.

The Earth current recorders were operated throughout the month with a period of high activity.

(Baumgartner for Elvey)

ARCTIC PALEONTOLOGICAL STUDIES:

This project arrived in the field too late for significant results in June.

(Geist)

OPERATION OF THE LAKE PETERS CAMP:

The Lake Peters camp has now grown to three permanent buildings plus a Jamesway and two tents. Research projects conducted at this camp during June have included: 1. limnological studies by John Hobbie and David Moore of AINA, 2. melting ice studies by David Barnes and Frank Leavitt of USGS and Dartmouth, 3. meteorological observations by Ellsworth Clarke and Carroll Rock of AINA and USAQR&D, 4. ornithological studies by Thomas Cade, ARL, and 5. soil classification by Jerry Brown, ARL.

The new permanent building for living and scientific quarters has been completed. The mess building has been insulated and equipped with a new stove and sink. On June 29 an Air Force helicopter established a cache for the future study of Chamberlin Glacier and resupplied the surficial geology party of Charles Lewis.

(Riddell for Holmes)

STRENGTH OF MELTING ICE SHEET:

During the month of June the strength of the Lake Peters ice sheet completely decayed. At the beginning of the month several tons, or almost the same load as in winter time, was required to break a large, in-place beam; but at the end of the month a few hundred pounds would break the same beam. The most significant strength decay is localized at refrozen cracks which have little influence on the earlier ice strength. Grain boundaries also are greatly weakened, but individual crystals retain considerable strength. The strength decay also appears to be much more pronounced in ice with horizontal crystallographic axis than in ice with vertical crystallographic axis - a variation that results directly from a difference in albedo, which is probably caused by a difference in ease of vapor figure migration.

During the month a continuous record of ice melt, surface ablation, radiation and micromet data has been obtained. Ice strength has been measured by small-specimen, ring tensile tests at periodic intervals. Seismic measurements of elastic properties have also been made at ten-day intervals. However, large, in-place beam tests had to be interrupted during the critical period between June 10 and June 29 due to a failure of the take-off shaft of the large chain saw. This equipment failure seriously reduced the accomplishments of the project.

(Barnes - USGS)

LAKE PETERS LIMNOLOGICAL STUDIES:

During the month of June the observations started the previous month were continued on Lake Peters and Lake Schrader. Productivity and temperatures were measured at four-day intervals and light extinction values at eight-day intervals. Samples of water were taken for future examination for total phosphates and plankton.

After the streams started to flow during the first week of June, a program of stream gaging and stream thermal budget measurement was instigated. Carnivore Creek, the main influent of Lake Peters, reached its peak towards the end of June. A water-level recorder was set up on the stream and nine stream flow measurements were made so that a rating curve may be drawn. Additional measurements were made of four other streams in both lakes. At the Lake Peters camp, a water-level recording station set up in 1958 was reactivated. Four water thermographs were placed in streams and two at different levels in the moat near camp.

Since the first week of the month I have been assisted by David Moore, employed by AINA. Due to the moat development we have had to walk from the 15th on and this considerably slows down the work.

Latest predictions are that the ice will last at least three and one-half weeks longer than in 1958 when it was melted by June 28.

(Hobbie - AFCRC, AINA)

ORIENTED LAKES:

June 6 The investigator arrived in Barrow.

June 8-9 Put solar radiation recorder into operation.

June 10-11 Examined holes with O'Sullivan.

June 12-13 Sampled four 20-foot holes, 32 inches in diameter, in Loon Lake and one in Ikroavik Lake. The holes were sampled to bottom at one-foot intervals.

June 16-25 Examined 10 lakes in the Colville valley at Umiat. Temperatures, pH, water samples, sediment cores, and permafrost depths were features of the investigation. Eighteen cores and 10 water samples were taken.

June 26 to June 30 (and continued in July) Daily observations were made of Loon and Ikroavik lakes in the Barrow area. Temperatures and permafrost depth were the main objectives. Observations on ice configuration and distribution and meteorological phenomena were also made. A boat was used to some extent on Ikroavik.

(Carson for Hussey)

GEOLOGIC AND GEOMORPHIC INVESTIGATIONS:

Michelson and O'Sullivan sampled and described holes which had been drilled the previous fall and spring but had not yet been sampled. These were 32-inch diameter holes and were sampled by hand. The 24-inch holes drilled in the spring were sampled from the bottom of the auger bit with hand sampling of selected horizons. Some time was devoted to Michelson's study of holes which had previously been sampled but were of interest as characterizing certain aspects of the permafrost.

An area containing 14 holes was surveyed to determine their relative elevations and locations. This is planned for the rest of the area sampled.

Three holes in Loon Lake and one in Ikroavik Lake, all 20 feet deep, were drilled and processed in mid-June before the holes thawed. These holes were primarily for determining the difference in moisture content of the surficial materials with respect to the lake outline. This information was obtained for Carson in furthering the lake study.

A twenty-foot hole was drilled on the beach ridge surrounding Central Marsh. This was drilled in conjunction with the soils project from Rutgers.

GEOLOGIC AND GEOMORPHIC INVESTIGATIONS - Continued:

After the snow cover left in mid-June, Michelson continued work on the "beach ridge" and other high areas. A portion of this study necessitated a topographic survey of selected areas to determine the relative elevations and relations of these high surfaces to each other and to the gravel beach ridges. Michelson obtained water samples from Ikroavik and Imaiksoun Lakes to determine the increase in salinity due to the growth of six feet of ice during the winter.

(Michelson and O'Sullivan for Hussey)

GEOLOGIC MAPPING:

Between June 6 and June 28, C. R. Lewis and L. Chase, geologists, USGS accompanied by L. Spetzman, botanist, USGS moved by boat from the junction of the outlet to Lake Schrader down the Sadlerochit River to the Arctic coast. Geological side trips were made from 7 separate camps during this period, mainly in the area between the Sadlerochit and Hulahula Rivers. Glacial deposits were mapped in the valley of the Sadlerochit south of the Sadlerochit mountains and in the entire Sadlerochit-Hulahula divide area down to elevations of about 650 feet. There is abundant evidence that the highest hills in these areas as well as the southern and southeastern flanks of the Sadlerochit Mountains have been glaciated.

Large ancient alluvial fan deposits originating from the north flanks of the Sadlerochit Mountains were mapped but no glacial deposits were found in the area east of the Sadlerochit River.

Between the Sadlerochit and Hulahula Rivers at about latitude $63^{\circ}43'N.$, the northern edge of the till sheet is defined by a sharp break in slope, but any outwash deposits or other proglacial features north of the till are obscured by strong cryoplanation, development of a thick organic cover, and lack of cuts.

Alluvial deposits related to the Sadlerochit and Hulahula Rivers were mapped and areas of icings and associated pingo development were outlined. Areas of "upland gravels" - well rounded gravels and cobbles capping hills 200-300 feet above the Sadlerochit River - were mapped around the eastern flanks of the Marsh Creek anticline and fine-grained unconsolidated marine deposits were examined along the coast near Anderson Point.

In addition, large springs - comparable to the Shubelik Springs - were located issuing from talus near the eastern nose of the Sadlerochit Mountains.

(Lewis)

BOTANICAL SURVEY:

A three-man U. S. Geological Survey party headed by Charles Lewis, investigating glacial history of the arctic coastal plain south of Barter Island, completed a boat traverse down the Sadlerochit River during June. Starting at Lake Peters on June 6, where we were moved by A.R.L., we traversed about 20 miles by bombardier (small tracked vehicle) to a point on the Lake Fork while there was sufficient water in the river for periodic movement by canvas boat down stream but, due to shallow rapid water with scattered boulders, only 3 to 5 miles per day could be made before the boat needed patching.

The Pleistocene geology of this area proved to be what was expected from previous study of aerial photography. A mantle of glacial gravel was common covering the hills to within less than 10 miles of the Arctic Ocean. Erratic boulders were scattered over much of the rolling terrain in the foothills.

An interesting large spring was discovered on the west side of the Sadlerochit River near the front of the Sadlerochit Mountains. Clear water containing some lime, and flowing at the rate of about 50 cubic feet per second, forms a stream that flows along a terrace of the Sadlerochit River for several miles then forms an aufeis field about five miles long. Near the spring were found about a dozen kinds of plants that are scarce to rare on the Arctic Slope, including two ferns that are new for this area, poplar trees 10 feet high, and such shrubs as prickly rose, spiraea, twinflower, and high-bush cranberry. These plants probably represent remnants of an earlier flora when the climate was warmer.

(Spetzman)

ECOLOGY OF JAEGERS:

The investigation returned to Barrow from the Pitmegea River on June 1. Pomarine Jaegers had not yet been seen at Barrow in any numbers and by the end of the first week in June it was evident that there would be no breeding population of jaegers at Barrow this season. It was decided to return to the Pitmegea River and investigate the populations of Long-tailed Parasitic and Pomarine Jaegers which had arrived and started breeding activities in late May.

June 13-26 were spent at the Pitmegea River. During this time 14 long-tail, 3 parasitic, and 3 pomarine nests were found on 6 square miles of tundra. This high density of predatory birds are nesting in response to a high population of Microtus oeconomus. Ten of these nests (3 pomarine, 3 parasitic, and 4 long-tail) were fenced.

On June 28 I was flown to the Kaolak River, and remained there until June 30. Eight long-tail and 3 parasitic jaeger nests were located and 5 long-tail and the 3 parasitic nests were fenced in. There was some

ECOLOGY OF JAEGERS - Continued:

evidence that the microtine rodent population in the area might be on the increase. It is planned to re-visit this area in late August and census the rodent populations, at the same time collecting the food pellets of the young jaegers left in the wire enclosures about the nests.

(Maher)

MAGNETIC OBSERVATORY:

The geomagnetic project at the Arctic Research Laboratory was continued during the month of June. Declination, Horizontal Intensity, and Vertical Intensity were determined through observations conducted weekly at the absolute building near Barrow Village. An earth inductor was used to measure a Vertical Intensity. Declination and Horizontal Intensity were measured with a Ruska field magnetometer.

Changes in the magnetic field were recorded photographically 24 hours a day for the month by the insensitive and rapid run magnetographs.

The month was unusually quiet magnetically, with the exception of one magnetic storm of moderate activity, commencing at 0600 GMT, 26 June, and ending at 2200 GMT, 30 June. The maximal activity on K-scale 0 to 9 was 7, which occurred during the 7th 3-hour period on 29 June. The ranges during the storm were: Declination: 516'; Horizontal Intensity: 1528 γ; Vertical Intensity: 897 γ.

Processing of data and records was continued during the month.

(Meyer)

BEHAVIOR OF EIDER DUCKS:

The spring migration continued well into June with favorable winds from the SE, S and SW. On June 4th, the wind switched from NE to SE and the numbers of migrating Pacific Eiders down the open lead increased markedly.

Flights were made to Wainright on June 5th and to the Nikilik on June 6th, but no movement or concentration of eiders was observed.

On June 6th the first Spectacled Eiders were seen in small numbers migrating with flights of King and Pacific Eiders. A heavy migration comparable to the astonishing numbers of some days in May, (10,000 per hour) occurred on June 8th. In these flights two pairs of Stellers Eiders were observed close in, the first recorded by the investigator this year and by the Eskimos as far as could be determined.

A trip down the open lead was made by umiak on June 10th, and as many Spectacled Eiders as Pacific Eiders were observed and shot by the occupants

BEHAVIOR OF EIDER DUCKS - Continued:

of the boat. This was an unusually heavy migration of Spectacled Eiders. King Eiders were conspicuous by their absence.

There was little or no movement from June 12th-14th due to mist and a narrow lead. On June 14th the investigator left for Umiat. No eiders were observed flying down river, perhaps due to the river having broken up on May 23rd. On June 24th the investigator left Umiat for the Colville Delta. A report on the ecological and breeding study of the Spectacled Eider will be mentioned in the July report.

(Daniel for Myres)

AURORAL PROPAGATION STUDIES:

Receiver Site: Records have been taken for the whole month.

Transmitter Site: One transmitter was placed in operation this month. Work progressed on the other transmitters and antennas. Mr. J. W. Koch, section chief of section 85:40, arrived on 23 June for a four day inspection tour.

(Workman for Petrie)

STRUCTURAL AND MECHANICAL PROPERTIES OF ICE:

Strain Gage Stations

The strain gage station on the fresh water lake was loaded with several pieces of heavy equipment for 48 hours and readings were taken over 72 hours. The data are in the process of evaluation and at the present time no conclusions have been reached except that strains were observed.

All three strain gage stations were removed from the ice and returned to the Laboratory.

Tri-axial Shear Studies

Construction of the temperature controlled laboratory is complete.

The tri-axial shear machine has been assembled in one of the laboratories and modifications for its special use are 50% complete.

The shop has been unable to complete the ice specimen freezing apparatus and the completion is being accomplished by the investigators. At present, it is 75% complete.

(Peyton)

ECOLOGY OF ARCTIC MICROTINE MAMMALS:

The main activities of this project consist of sampling microtine populations, examining and comparing their habitats, and following predator populations that depend on them. At Barrow, Lemmus occurred only in moderate numbers. But sign of winter feeding activity, though not common, was found regularly after adequate melt-off so that '59 will evidently be a summer preceding a cyclic high. Onset of large-scale breeding in lemmings was delayed by late melt-off, but by the end of the month, pregnancy rate was increasing rapidly. Large samples obtained during melt-off showed both by uterine scars and proportion of small individuals that, locally at least, winter reproduction was good. In no previous early-summer samples handled by us in the Barrow area has there been such a high proportion of adult females with two and three sets of scars (i.e., two or three litters born in succession in winter months). About 400 specimens of Lemmus from the Barrow area were processed in June. First runs of trap-lines established near Barrow in 1955 were started on the 28th. For the first time since 1953, the collared lemming (Dicrostonyx) has been present in small numbers locally.

Lemming predators appeared late on the tundra because of late melt-off. They were most numerous in the period June 12-20, when Pomarine Jaegers were both passing through the area in greatest numbers and settling locally. The settlers, white paired and territorial, generally deserted their areas by the 20th, and at best occurred no more densely than one pair per square mile. Also in the same interval, both Snowy and Short-eared owls were observed, but only in small numbers of individuals wandering locally and also becoming scarce by the end of the month.

Cade spent the first half of June at Lake Peters, where he established and ran one sampling line for microtines, catching three species, of which Microtus miurus was most common. He located seven active nests of the Northern Shrike, a predator of microtines and other small vertebrates, and obtained data on breeding density and feeding habits of this species. In the latter half of the month, at Umiat, he started re-runs of trap lines established there in 1955.

Childs arrived 16 June and proceeded to Pitmegea River soon after. Population build-up there of Microtus oeconomus in late '58 has proceeded to a lemming-type high, with catches from sampling lines exceeding previous maximal catches by striking margins and with predators breeding in high numbers.

Survey flights over the arctic slope, by Pitelka, with endpoints at Pitmegea River, Meade River, Umiat, and Oliktok Point revealed no areas of abundant predators or signs of winter cutting of vegetation, except for the situation along the Pitmegea River itself, already mentioned above and anticipated by Childs' field work there in '57 and '58. Because of the delay of the next cyclic high in Lemmus near Barrow from '59 to '60, the non-synchrony of Wainwright and Pitt Point with Barrow in '56 and '57 may be "corrected", so to speak, and a larger portion of the coastal plain may be in phase at the time of the next high than was true in '56.

ECOLOGY OF ARCTIC MICROTINE MAMMALS - Continued:

Since lemming numbers near Barrow this June were relatively low and since their predators were not only comparatively few, but present only temporarily, some time was spent in getting data on bird populations which will valuably supplement earlier studies on this project because the '59 season has been later than any previous one experienced by us. Two plots were censused for breeding bird densities and samples of Lapland Longspurs were taken to document the onset of breeding and clutch size (later and lower, respectively) than in previous seasons.

(Pitelka)

ECOLOGY OF MICROTINES AND SHOREBIRDS:

The period 1 June to 16 June was spent at the Peters Lake station. Extensive studies on the breeding biology of the local birds were carried out; nesting activities were observed around the entire perimeters of Peters and Schrader Lakes, along a tributary of the Sadlerochit River to a point 6 miles north of Schrader's Knob, up the valley of Whistler Creek for a distance of 5 miles, in two passes of the Mary Range between Peters Lake and Whistler Creek, and up the valley of Carnivore River for a distance of 8 miles. Particular attention was given to the passerine birds inhabiting this area, and breeding activities were observed for the following species: Say's Phoebe, Horned Lark, Northern Raven, American Robin, Wheatear, Water Pipit, Northern Shrike, Gray-crowned Rosy Finch, Redpoll, Savannah Sparrow, Tree Sparrow, White-crowned Sparrow, Lapland Longspur, Smith's Longspur, and the Snow Bunting. The shrikes and redpolls received the most attention. Seven pairs of breeding shrikes occupied an area of about 12 square miles; the information obtained on their breeding biology, behavior, and food habits represents a particularly valuable body of data, since very little is known about the northern shrike on its breeding grounds.

Two nests of the Parasitic Jaeger were under observation, and evidence was obtained to indicate that the Least Sandpiper is a breeding bird of this area (it is not known at present to breed anywhere else on the north slope).

Observations were also made on the occurrence of Microtine rodents, and one standard sampling line of traps was run in a wet marshy area between Peters and Schrader Lakes. Microtus miurus was the only rodent that appeared to be common in the region around Peters Lake.

The period 16 June to 18 June was spent at Barrow.

On 18 June the investigator went to Umiat, and the remainder of the month was spent there in trapping the 10 standard microtine sampling lines, which have been established for 5 years now. Microtine rodents proved to be only moderately common, but there was some indication that Lemmus was up in numbers from last year. Dicrostonyx was way down, no animal being caught on any of the 10 lines.

On 24 June a reconnaissance flight was made with Bob Main and Otto Geist up the Killik River and over the Kurupa Lakes and return to Umiat.

(Cade)

ECOLOGY OF MICROTINES:

Arrival at Barrow on June 16 was followed by preparation for field work in the Cape Sabine area which commenced June 21. On that date a flight from Cape Beaufort south to the headwaters of the Kukpowruk River and continuing to the headwaters of the Kivalina and Kukpuk Rivers was made. The latter river was followed west with a side trip over Cape Thompson. The return to Cape Sabine was via the Ipewik River and Corwin Mine. The purpose of this trip was to locate the large caribou herd seen in this area in late June and early July of 1957 and 1958. Only a scattered few hundred were seen, however, in the Corwin Mine area. Trails were plotted from the air which indicated nicely the general trend of movements in the Cape Lisburne-Point Hope area.

Field work at Cape Sabine consisted of re-running 8 standardized trap lines and general observations. The Microtus oeconomus population continued its upward course from last August, 465 being taken. In addition 4 Lemmus were trapped. As a consequence avian predators were considerably more abundant and will be reported on by Wm. Maher.

(Childs)

MAPPING OF PLEISTOCENE GEOLOGY:

The field party was flown into Anaktuvuk Pass on 13 June, landing on the ice at Summit Lake. On 14 June a base camp was set up at the village of Anaktuvuk Pass and work begun on 15 June.

Most of June was spent carrying out a regional reconnaissance of the area to familiarize ourselves with the rock units with which we will be working. Mt. Ingstad, east of camp, was ascended and the Devonian clastic sequence studied followed by a climb of Janet Peak and Nearby Peak 4000 feet which display Alapah and Wachsmuth Limestones, Kayak Shale, and Upper Kanayut Conglomerate. A ridge traverse of pre-Mississippian rocks, forming peaks south of Contact Creek, was carried out and complex structure in the form of overturned isoclinal folds was noted.

Several days were spent becoming acquainted with the surficial stratigraphy and morphology, and with four glacial units tentatively being identified: Itkillik, Echooka, Alapah Mtn., and Fan Mtn. In addition, work was begun on geomorphic features and processes.

Due to the kindness of Shell Oil geologists down-valley, the party spent a day studying the type sections of the Alapah Limestone, Wachsmuth Limestone, Kayak Shale, Kanayut Conglomerate, and unnamed sandstone and shale below the Kanayut Conglomerate in the Shainin Lake area.

Using Kayaks supplied to John Campbells party, soundings were taken of Summit Lake. The maximum depth was determined to be 45 feet. Next

MAPPING OF PLEISTOCENE GEOLOGY - Continued:

season bottom sediment cores will be taken, preferably early in the season with ice on the lake, for palynological study which will aid Pleistocene correlation.

Upon completion of reconnaissance work the party established an advanced camp five miles up Inukpasugruk Creek and began detailed work on bedrock and Pleistocene geology of the southern part of the area.

Weather remained mostly clear and warm in June providing ideal conditions for field work.

(Porter)

NPR-4 OIL FIELD INVENTORY:

The inventory of oil field property at Barrow continued during the month in preparation for future sales.

Saltsman returned from medical leave on 18 June.

Mrs. Harding has completed most of the typing of sales lists and her services were terminated on 30 June.

(DARL for Saltsman)

SEA ICE PHOTOGRAPHY:

During the course of the month a series of black and white photos were made of the fast ice in the Barrow area to show the effects of various exposure combinations on the image recorded and to collect a partial history of the melt season and growth of puddles. Also, three rolls of Ektachrome were exposed to ascertain the usefulness of this film type, but the film must be taken elsewhere for processing. Records were kept of the illumination and color temperature of the ice at the time of the photography and as soon as possible after the aerial exposures, ground photos were taken to provide a more detailed record of the "look" of the ice. The ground correlation also afforded an opportunity to keep records of the average depth of the puddles.

All of the aerial photography was taken during clear weather and bright sun as the only other condition was fog. There was no occurrence of a high cloud cover during the month.

Generally, all factors contributed to a very successful month of data collection.

(Sater)

BEACH AND NEAR SHORE STUDIES:

Drs. Schalk and Hume arrived on 28 June and began assembling equipment for field work once the ice conditions at Point Lay permit.

(Schalk)

TUNDRA VEGETATION STUDIES:

1. Shanks and Koranda drove to Alaska, arriving at U. of Alaska June 14 and June 8; Shanks picked up spruce seedlings for planting trials at Indian Head, Sask. and transported them to Alaska; arrangements were made for lab space at U. of Alaska and for planting a series of the spruce seedlings in the Fairbanks area by the U.S. Forest Service; additional series of seedlings collected in the Fairbanks area.

2. Shanks and Koranda arrived at Barrow 17 June checked snow cover and readied equipment for field work.

3. Shanks and Koranda carried out field work on Firth River and Mancha Creek 22 June - 25 June, principally collecting plants and observing the seasonal stage of vegetation and melt-off; spruce seedlings collected for transplant trials, and trial plantings of full series made.

4. Shanks carried out field work with Tedrow on the Killik River above Ivisak Creek 26 June - 1 July; at Anaktuvuk Pass 1 July - 4 July; at Porcupine Lake 5 July - 7 July; at Umiat 8 July; altitudinal sequences of soil and vegetation and soil temperatures were studied and plant collections were made.

5. White spruce trial plantings were made at the following points:

Fairbanks	16 June
Mancha Creek	25 June
Killik River	30 June
Anaktuvuk Pass	4 July
Umiat	8 July

About 100 plants were used at each place except Fairbanks, where neither Firth River or Fairbanks plants were used; in so far as available 10 plants were used in each trial planting from each of the following sources:

Firth River	69° N
Fairbanks	65° N
Saskatchewan A	52° N
Saskatchewan B	52° N
Maitoba A	51° N
Manitoba B	51° N
Ontario A	49° N
Ontario B	47° N
Quebec A	48° N
Quebec B	47° N

A set of seedlings of the year from an Alaska Highway source was also received but due to their small size and poor condition they were held in the greenhouse at Barrow.

TUNDRA VEGETATION STUDIES - Continued:

6. Koranda carried out field work with Childs on the Pitmegea River 27 June - 1 July; attention was devoted primarily to plant collecting and observations on the vegetation.

(Shanks)

ARCTIC ICE AND PERMAFROST:

Field work.--The regular schedule of geothermal measurements are continuing at Barrow, Fairbanks, and Glennallen, Alaska. The readings at the latter installations were obtained by the Army Corps of Engineers and the Bureau of Public Roads. Phillip Sovalik continued thermal observations at key Barrow installations to obtain supplementary information needed in the interpretive studies.

Data processing and preparation of reports.--Page proofs for two manuscripts: "Periodic heat flow in a stratified medium with application to permafrost problems," USGS Bull. 1083-A, and "Dissipation of the temperature effect of drilling a well in Arctic Alaska," USGS Bull. 1083-C, were corrected and returned to the Branch. An abstract, "The contraction theory of ice-wedge polygons" was submitted for presentation at the 10th Alaskan Science Conference.

Work was continued on the interpretation of thermal data at Glennallen (Greene), the compilation of results of thermal properties measurements (Marshall), laboratory testing of field samples (Munroe), and the conversion of thermister data (Kuehn).

Miscellaneous.--Lachenbruch presented a talk "Tension fracture in a nonuniform stress field" to a seminar in Geophysics at Stanford University. He also attended a symposium on Soil and Foundation Engineering at the University of California at which several visiting Russian scientists spoke. There he had a chance to discuss Soviet permafrost publications with Professor N. A. Tsyтовich, a Russian authority on permafrost.

(Brewer and Sovalik)

ACTIVITY HABITS OF ARCTIC ANIMALS:

I found the arctic ground squirrels fairly sparse and scattered in the Pitmegea River-mouth area, and it was difficult to obtain quantitative data as to the times of their activity by trapping, since the traps had to be placed at fairly large distances from each other. Visual counts were likewise impracticable. No more than an indication of day-time activity in good (sunny) weather was found here. However, data of light intensity, wind and temperature recorded here may be very helpful in establishing later laboratory experiments to determine how the physical environment affects daily endogenous rhythms. Six females and one male equirrel were brought back to the laboratory. In addition several Microtus oeconomus were brought back to the laboratory. I doubt that the data will show a significantly greater activity

ACTIVITY HABITS OF ARCTIC ANIMALS - Continued:

at "night" than during the normal daylight hours; however, more may be seen at night. No other rodents were seen. Live arctic plants and mosses were collected and sent to the Princeton Laboratories for rhythm studies. No fruit flies were collected.

Tom Cade reports having seen no ground squirrels in the Umiat area this year, and I also found none. A few scattered burrows from this year is all, but these were not particularly fresh. No fruit flies were collected.

No squirrels were seen from the air around Porcupine and Wahoo Lakes. We landed at a lake at 146⁰⁴⁴', 68⁰⁴⁹'. I found very few signs of squirrel activity there.

Good meteorological data was obtained at the Kaolak River campsite area. Indicative quantitative data on squirrel activity was obtained visually. Several were trapped and a male and a female were brought back to the laboratory; only one male was trapped. It was noted that they were active at least to some degree during stormy or overcast days. Twice as much activity was noticed between six and seven AM than at any other time, though further observations are necessary to verify this under all conditions. Although there were many indications of past vole or lemming activity, no such animals were trapped in the ten live traps; none were seen. No fruit flies were collected.

Some of the above animals plus some others already on hand at the laboratory were put in running-wheel cages. I hope to determine if the activity of the animals in cages is correlated with field observations, and later I hope to find out if these animals behave the same way out of the arctic, i.e. at Princeton, N.J. Two arctic ground squirrels of a different subspecies plus some red-back voles were sent up from the Fairbanks area after measuring their activity there. It will be seen if they behave the same way in the arctic. One Kaolak River squirrel was put in a light tight box with a running-wheel to see if it has a free-running endogenous rhythm or if the rhythm is kept in phase by the temperature changes or daily fluctuations. These experiments will be carried on in absentia while I am making further field observations down into central Utah.

(Swade)

PEDOLOGIC INVESTIGATIONS:

A schematic, global concept relating to soil forming potentials in northern latitudes has been published (J. Soil Sci. 9:33-45). This concept includes the weakening soil processes in areas of lower temperature. In order to follow this weakening potential, it was necessary to make field studies of soils at various altitudes in the Brooks Range. The soils study was integrated with botanical studies (Dr. R. E. Shanks, Professor of Botany, University of Tennessee). After making studies in three locations it was found that at about 5500 feet altitude in the Brooks Range the soil forming potential is near the "zero" point. These findings agree with observations in the Okpilak River area (see 1958 progress report of J.C.F. Tedrow).

(Tedrow)

PEDOLOGIC INVESTIGATIONS:

A short time at the beginning of the period was spent on McCall Glacier which afforded an opportunity to examine morainic and embryonic soil conditions at high latitudes (5800 - 7000 feet). The latter part of the month was spent at the Peters Lake camp where a general reconnaissance study of existing soil conditions was conducted with objectives similar to those undertaken in the Okpilak area. Somewhat similar soils exist in both areas, although areal distribution of the various soil types differ primarily according to topographic and glacial features.

(Brown for Tedrow)

PEDOLOGIC INVESTIGATIONS:

Douglas and Brown arrived at ARL, Barrow on June 10. The late snow in the Barrow area prevented field work here, so on June 16, Douglas went to Umiat. The relationships between soil type and microtopography were studied at Umiat. Douglas returned to Barrow on June 22. Soils samples, collected at Umiat, are being analyzed for soluble salts.

Balloni arrived at Barrow on June 21, and will assist Douglas until he can join Brown in the field.

(Douglas for Tedrow)

VHF TRANSMISSION:

Three antennas were strung on the poles which had been erected last fall. Connections were made from these to the inside of the building which will house the radio units.

A communication cable was laid between the field site and building 250 in the Barrow camp, a distance of 4000 feet.

(DARL for Toman)

ARCTIC HEALTH RESEARCH CENTER

Program Progress Report
July 1, 1958 - June 30, 1959

AHRC ADVISORY COMMITTEE

The AHRC Advisory Committee, appointed in late June 1958, held its first meeting on November 14, in Washington, D.C. Members of the Committee include: Dr. Frederick Brady, Program Officer (Research) BSS; Dr. James K. Shafer, Chief, DGHS; Dr. Robert Anderson, Chief, CDC; Dr. Justin Andrews, Director, NIAID; Dr. Albert Chapman, Chief, DSHS; Dr. Floyd Daft, Director, NIAMD; Mr. Mark Hollis, Chief, DES; and Dr. James Shaw, Chief, DIH. The initial meeting was largely devoted to orienting the newly-appointed Committee to the objectives, organization and program of the AHRC.

INTERAGENCY RESEARCH ADVISORY COMMITTEE

Evidence of increasing interest among scientists, both within and outside Alaska, in the 49th State as a potential area for health and medical research stimulated discussion among members of the staffs of the AHRC and the Alaska Native Health Service of the need for an advisory body to assist in coordinating and promoting research efforts in the health and medical fields in Alaska. Following preliminary discussions, the Alaska Department of Health and the Arctic Aeromedical Laboratory, USAF, were invited to participate in the formation of such a group. The first organization meeting was held on October 3, 1958, at which time the functions of the Committee were outlined as follows:

1. Facilitate cooperation between research, medical care and preventive medicine groups in Alaska.
2. Facilitate intergroup contacts to foster interest in research, medical care and preventive medicine problems.
3. Facilitate improved communications among the various agencies and individuals involved in these activities.
4. Facilitate orientation of visiting scientists.

The Committee ordinarily meets the second Wednesday of each month or on call of the chairman when there are matters to be discussed. Several research proposals have been received and considered by the Committee during the past year.

RESEARCH

Epidemiology

The recent verification, by laboratory tests, of a second case of human brucellosis from northern Alaska within the past year has strengthened the belief that reindeer and caribou may be potential reservoirs of this disease. The two cases, involving two young Eskimo girls from Barrow and Wainwright, were confirmed by laboratory examination made by Dr. I. F. Huddleston of Michigan State University, who succeeded in isolating Brucella suis; var. Thomsen from the blood of both patients. Although there was no apparent connection between the two cases, which occurred in different localities and some eight months apart, in both instances caribou, which is the principal item of the diet, was eaten raw, fresh or frozen. According to information now available to us, B. suis has heretofore been isolated from man, but only from hare and swine in Western Europe and Russia.

A total of 49 cases of human brucellosis were reported by the Alaska Department of Health between 1939 and 1957. However, more than half of the reported cases occurred in 1942 in Fairbanks, and were attributed to the ingestion of raw or improperly pasteurized milk. Routine testing of dairy herds in 1957 revealed only one positive reactor among Matanuska Valley herds and none in the Tanana Valley, the two chief milk-producing areas. As far as could be determined, no fresh milk or dairy products were consumed in either Barrow or Wainwright during the past year. Since cases of "fever of unknown etiology" are often reported in Alaska, it is quite possible that sporadic cases of human brucellosis have been missed in the past.

Aside from the potential public health importance of this disease, its possible effect on the economy of the natives is of considerable significance. Records kept by reindeer herders show a high rate of abortion among reindeer in the Wainwright area in past years. Dwindling of the herds, which still constitute the major source of income for some native people, is attributed in part to mixing of the reindeer with the caribou. In large areas of northern Alaska caribou are the primary source of food, clothing, bedding and, in some cases, shelter. Further investigation of reindeer and caribou as reservoirs of infection is indicated.

The Corneal Scarring Pilot Study, begun in November 1958, has now been extended to the 24 villages selected for participation. Fifteen of the villages have been revisited. A total of 4034 persons have been examined for corneal scarring to date (74% of the total population of the 24 villages). Forty-one per cent of those examined were found to have corneal scars.

Comparison of the data on visual acuity obtained during the initial screening in the Bethel area, with results obtained in previous studies among similar groups elsewhere shows the following:

Area	Percent with visual acuity of 20/50 or better		Source of data
	Without scarring	With centrally located scarring	
Bethel Area	87%	53%	Current AHRC study
Southeastern Alaska	88%	47%	Fritz et al. Am. J. Opth. 34:177-184. 1951
Yukon Territory	86%	49%	Duggan et al. Am. J. Opth. 46:210-212, 1958.

Observations on corneal scarring in the Pilot Study were correlated with the results of tuberculin tests given school and pre-school children in Kwethluk and Hooper Bay, and school children in Bethel in connection with the Bethel Prophylaxis Study. Each of 547 children who had been examined for corneal scarring within the preceding six months was given 5 tuberculin units, PPD-S. Quantitative readings were made at 48 hours, and certain of the non-reactors (> 6 mm induration) were retested with 250 T. U., PPDS. The following summary indicates some of the more important findings:

1. 323 (59%) of the children were reactors; to 5 T.U.; 210 (38%) had corneal scarring.
2. 192 (91%) of children with scarring were reactors; likewise, 192 (59%) of reactors had scarring. Only 18 (9%) of children with scarring were non-reactors to 5 T.U. Fifteen of the 18 were retested with 250 T.U.; five were reactors to the more concentrated dose. Of the 10 who showed no reaction, four had had one or more prior x-ray readings classified as "primary tuberculosis", and all of the remaining six have one or more household associates who are currently listed in the Tuberculosis Register, Alaska Department of Health.
3. A striking parallelism between frequency of reaction to 5. T.U. and prevalence of corneal scarring was consistently observed in various subgroups of the population tested. As is shown in the following table, when frequency of tuberculin sensitivity was high, prevalence of scarring was also high; when hypersensitivity was low, scarring was low.

Summary Table: Reactivity to tuberculin (PPD-S, 5 T.U.) in relation to presence or absence of corneal scarring, according to various attributes including village, race, sex, birth year, and prior vaccination with BCG. Bethel, Kwethluk, Hooper Bay, 1959.

	Total No. (100%)	Number				Percent	
		tbc. reactors with scarring	tbc. reactors without scarring	tbc. nonreactors with scarring	tbc. nonreactors without scarring	tbc. reactors	with scarring
Village-race							
Bethel (total)	191	62	61	10	58	64%	38%
Native	141	57	48	8	28	74%	46%
Native-mixed	39	5	12	2	20	44%	18%
White	11	0	1	0	10	9%	0
Kwethluk	114	43	28	2	41	62%	39%
Hooper Bay	242	87	42	6	107	53%	38%
Sex							
Male	281	97	66	6	112	58%	37%
Female	266	95	65	12	94	60%	40%
Birth year							
1956-59	89		2	1	86	2%	1%
1953-55	71	5	10	4	52	21%	13%
1950-52	135	47	30	10	48	57%	42%
1947-49	128	58	49	3	18	84%	48%
1944-46	83	54	27		2	98%	65%
a - 1944	41	28	13			100%	68%
Received prior BCG							
Yes	163	48	37	6	71	52%	33%
No	334	144	94	12	135	62%	41%
Total	547	192	131	18	206	59%	38%

Tyonek Study

The field-phase of the Tyonek Study was discontinued in April pending evaluation of results to date. Dr. Stanley Edwards, PHS Medical Officer with the PHS Alaska Native Hospital, Anchorage, accompanied the AHRC epidemiologist on the final visit to the village, and made general physical examinations of 110 (81%) of the approximately 136 Tyonek residents. Recommendations, based on results of these examinations, were made for follow-up by the Alaska Native Health Service in instances where the need for further medical and dental care was indicated. Seventy throat specimens, and 79 blood samples were obtained for bacteriologic, virologic, and serologic study. Currently hospital records of all Tyonek admissions during the two-year observation period are being abstracted, the information correlated with field data and coded on punch cards preparatory to tabulation and analysis. The results should be forthcoming within the next few months.

Morbidity Study

Morbidity information continues to be submitted by lay reporters on St. Lawrence Island with remarkable regularity. Information gathered over the past 2 1/3 years has been transferred to punch cards, and analysis will begin as soon as the census data are brought up to date. Reporting has been amazingly complete as indicated by the fact that some 1850 illnesses, classified as infections, have been reported among the approximately 300 Savoonga residents since January 1, 1957. This represents an average of 2.7 illnesses/per person/ year. In 1958, 89% of the residents who were living in the village at some time during the year were listed as having one or more illnesses; three individuals had 11 illnesses, one had 13 and one had 14 illnesses during this interval.

Ecological Studies of Microbial Pathogens

Preliminary analysis of data obtained in ecological studies of enteroviruses reveals the following: from 814 specimens, obtained from 15 Alaskan villages, 99 virus isolations were made; 34 in suckling mice (presumably Coxsackie viruses), and 65 in monkey kidney culture (other enteric viruses). In nine instances, a virus was derived from the same specimen in both media. This represents an overall recovery rate of 11%. When analyzed by village, however, the recovery rates varied from 8 to 45%. In nine surveys, no viral agents were recovered. Most consistent recovery was made from villages on the lower Kuskokwim River. Even at this preliminary stage, results indicate considerable variation by geographical areas in the ecology of enteric viruses, and the possibility of areas of high endemicity.

Otitis Media (ENT Study)

Laboratory study of specimens obtained in connection with the Ear, Nose and Throat Study show that the aerobic microflora of early otitis media closely resembles that found in normal throats, and is composed mostly of gram-positive cocci and corynebacteria. With advancing chronicity, the gram-negative rods - members of the Pseudomonadaceae, Enterobacteriaceae and Achromobacteriaceae families - become prevalent in the ear exudate, and even in the throats of diseased individuals. These latter types are resistant to most of the common antibiotics, thus accounting for the therapeutic failures in advanced chronic otitis media.

Sero-Immunology of Asian Influenza in Alaskan Natives

This study, started in F. Y. 1958, in several "closed" population groups, was first reported in F. Y. 1959. It demonstrated that "Asian" influenza had reached even remote areas in Alaska. In two island villages, 80 to 90% of the individuals tested (about 1/3 of the total population) had serological evidence of infection with the Asian strain. The study also indicated that vaccination of individuals in one village, midway in the epidemic period, interfered with production of maximum serological response. This appeared to be a matter of biological interference between vaccine and epidemic virus, rather than manifestation of induced immunity. This probability adds increased significance to the study, for indications of biological interference are rarely encountered in studies of epidemic human disease.

Bethel Prophylaxis Study

Twenty-two of the 24 villages included in the Bethel Prophylaxis Study had completed a year of pill-taking by the end of F. Y. 1959. A total of 5494 individuals have participated in the study, representing 83.8% of the entire population of the 24 study villages. Final reports of pill-taking in the villages which have completed the trial period are being processed for coding on IBM cards. Plans for follow-up of the study villages are being outlined, and the possibility of initiating the prophylaxis study in additional villages is under consideration.

The special six-months prophylaxis study, carried on at the three schools in Southeastern Alaska (Wrangell Institute, Mt. Edgecumbe High School and Sheldon Jackson High School and Junior College), was completed at the end of F. Y. 1959. The study was well accepted in all three schools. Records of pill-taking in the schools are being analyzed.

Ambulatory Chemotherapy Program

AMBULATORY CHEMOTHERAPY PROGRAM

Bethel Area

Changes in Case Load from July 1, 1958 to June 30, 1959

	<u>July 1, 1958</u>		<u>June 30, 1959</u>	
	No.	%	No.	%
Villages	21	100	24	100
Total Population	4217*	100	5428**	100
On Chemotherapy	420	100	342	6.3

* Population as of July 1, 1958

** Population as of January 1, 1959

Reasons for Changes by Quarter

	<u>CHEMOTHERAPY INITIATED</u>			<u>CHEMOTHERAPY DISCONTINUED</u>			
	Med. Reas.	Post. Hosp.	Moved to Village	Med. Disc.	Hosp.	Died	Moved from Village
1st Quarter	13	40	12	95	9	2	13
2nd Quarter	26	45	0	59	7	2	15
3rd Quarter	20	34	0	41	0	2	4
4th Quarter	11	36	1	53	9	0	5
Totals	70	155	13	248	25	6	37

The above summary of changes in the Chemotherapy Program in the Bethel area during the past fiscal year shows the encouraging and continuing increase in the number of persons medically discharged from home treatment over the number started on medication. Another encouraging note in the summary is the fact that the number of individuals started on chemotherapy following hospital discharge was more than twice the number for whom home treatment was prescribed for

medical reasons. The four field nurses continue their follow-up visits to individuals who have completed treatment in the 24 villages in which the program is still being carried by AHRC in conjunction with other studies.

Hydatid Disease

Attempts to develop an accurate diagnostic test for hydatid disease are continuing with AHRC supplying serum and CDC working out testing techniques. The hemagglutination test presently used is now considered of doubtful value for routine use, since a number of supposed negatives have proved positive on surgery. Four cases of alveolar hydatid disease have been diagnosed at the time of surgery or autopsy within the past year in Eskimos. The four cases, three of which terminated fatally, were distributed as follows; 2 Point Hope, 1 Kotzebue, 1 St. Lawrence Island. Indications are that the human infection rate is higher than had been thought, thus the urge for developing a reliable diagnostic test.

The Zoonotic Disease Section is continuing to cooperate with Dr. Magath of the Mayo Clinic, who is working on the complement fixation test for hydatid disease. Of 17 suspects tested by this method only one showed a high titer. This individual proved to have hydatid on surgery. Although considered fairly reliable at this stage, the c-f test cannot be used routinely as it must be performed under special conditions by a trained person. It is hoped, however, that it can be used for determining prevalence of hydatid disease in selected villages to start.

Increasing emphasis will be given to investigating possible sources of human infection within villages. Samples of floor sweepings and other materials have been collected for study, but time and other commitments have delayed this work.

The presence of widespread trichinosis infection in small rodents (*Microtus*) has been demonstrated for the first time. The infection appears to be common in these animals in inhabited sections. Work is continuing on problem of how marine mammals become infected. Present indications are that 50% of polar bears are infected, 1-2% of walrus and seals.

Summary of observations and data obtained thus far on rabies in Alaska indicates an atypical situation as compared to the southern 48 states. Although many infected foxes and dogs are found periodically, no clinically confirmed human cases have been reported in Alaska

in recent years, and only three clinically confirmed cases have been reported in the entire history of Alaska. Collection of new data on occurrence of rabies will continue. Attempts to find rabies virus in small mammals have been unsuccessful thus far.

To date, some 8 different species of fish tapeworm have been found in man in Alaska, including two unknown species. The six known species include: D. alascense, D. cordatum, D. dalliae, D. osmeri, D. dendriticum, and Schistocephalus solidus.

Schistocephalus was found in two humans. This is the first record of this parasite being found in man; it is more commonly found in dogs, but is normally a parasite of fish-eating birds.

Entomology

AHRC entomologists are convinced that, quite aside from their potential importance as vectors of disease, insects are a disease in themselves in Alaska. Observations and studies to date show that about 100 Alaskan insects belong to the biting Diptera: about 50 are species of black flies, 30 mosquitoes, 20 snipe and deer flies, and 10 punkies. They are not all of equal importance, but in toto they have played, and are playing, definite roles as deterrents to the development of northern areas.

Current developments in entomology include confirmation of the occurrence of Culiseta incidens in S.E. Alaska; new records of Alaskan tabanids (identified by Dr. C. B. Philip); description of habitat of snipe flies in S.E. Alaska. A considerable portion of time has gone into the rearing, sorting, sexing, freezing and shipping of great quantities of Alaskan mosquitoes to CDC-Kaiser Foundation collaborators for study of bite allergies.

Emphasis in the program of the Entomology Section has been redirected to some extent to stress medical entomology, without losing sight of the major problem of acquiring further basic information on the biologies of pest insects. The possibility of initiating arthropod-vector studies in connection with serological surveys being conducted by the Epidemiology Section (AHRC) is being explored.

The current insect season is showing an unusual prevalence of the mosquito pests Aedes communis and punctor, in the Upper Cook Inlet area. This is attributed to excessive snow-melt water and the unusually warm and sunny April-June weather. Current prevalence also presages a bad Culiseta pest problem next spring, as the species of the genus breeding now will be biting next spring. The current increased interest and activity in localized commercial spraying indicates the need for providing responsible authorities with some

guidance in working out an organized program of insect control for Alaska, inculcating sound administrative procedures and employing practical and purposeful methods of control. The present haphazard procedure whereby small air operations outfits or individual pilot-owners contract, at so much per family, for single, or at most two spray flights over various housing developments is, at best, wasteful, potentially dangerous and probably ineffective.

Black Fly Studies

Attempts to develop satisfactory 5x5x5 rearing cages for pupae and adults have not been completely successful in trials using P. fulvum. Further modifications are planned as time and current field activities permit.

Nearly 100 adults of P. fulvum have emerged in individual cages in the laboratory from field-collected pupae. These are presently confined in tiny cages and are being used for study of egg development. Some females have lived long enough to produce almost mature eggs.

After reviewing the slides prepared for chromosome study, Dr. Rothfels concurs that the Alaskan hirtipes 2 is distinct from the Canadian hirtipes 2; the latter has recently been described as mixtum S. & D. Consequently, the Alaskan hirtipes 2 is a new species needing a name and description, especially since it is one of the human biters.

P. frohnei has been taken for the first time from the vicinity of Anchorage. Lab emerged females have been found to readily bite humans; so this may eventually be taken biting in the field. Specially "fixed" larvae have been sent to Dr. Rothfels for chromosome study.

Rhagionid larvae (which were found to be predaceous on black fly larvae last summer) kept in captivity throughout the winter, pupated this spring and adults emerged. Much to our disappointment they are NOT biting snipe flies (Symphoromyia).

During the past year, a total of about 500 mature larvae were specially "fixed" and sent to Dr. Rothfels for study of the chromosome patterns. The larvae were of the following species: onychodactylum D. & S., doveri n. sp., travisi Stone, frohnei Somm., alpestre D., R. & V., and perspicuum Somm.

Physiology

Further studies of human adaptation to cold have been carried out on special groups during the past year. A preliminary summary of findings of the Old Crow Expedition, conducted during August and

September, 1958, was submitted with the report for that quarter.* A second brief expedition to Old Crow in March of this year confirmed metabolic results obtained during the fall, showing no seasonal change in response to cold.

A later study, involving two members of a sect whose members customarily go barefoot and wear only light robes, showed prolonged tolerance of cold feet without pain, and superior recognition of local skin temperature by the cold tissues. The learned adaptation to cold demonstrated by these two subjects is outstanding. Further studies with members of this group are planned.

Records and specimens have been prepared showing the distribution of birds at Old Crow, Iliamna and in the vicinity of Cook Inlet.

Environmental Sanitation

Water Supply Studies

Analyses of water samples collected at quarterly intervals during the past year in 23 Western Alaska villages indicate that, with the exception of iron and nitrate, all of the supplies come within U.S.P.H.S. drinking water standards. The samples showed considerable variation from village to village and from season to season as expected. The analysis, however, showed no overall characteristic pattern. Iron content of the 76 samples tested ranged from 0 to 16.6 ppm. Analyses for nitrate ranged from 0 to 45.4 ppm.

Attempts to use polyethylene liners in establishing experimental reservoirs were unsuccessful. Both the 8-mil polyethylene and the 10-mil polyvinyl liners developed leaks, apparently due to abrasion. Further attempts are being made using asphaltic material as a liner.

Modifications in the air lock system used for preventing freezing of water in pipes between pumping periods proved successful in an experimental installation. Additional refinements are underway to be tested during the coming winter. A wind charger, a low voltage generator, and a heating element have been installed at a well site located in the permafrost. This arrangement will be tested for effectiveness in preventing freezing during the 1959-60 winter season. A simple, economical and effective method of thawing frozen plastic water supply lines and 2-inch and 4-inch well casings was developed, in which recirculated heated water was jetted through the system.

*Ms, "Old Crow - a Healthy Indian Community", J. A. Hildes, Robert Whaley, Helen Whaley and Laurence Irving, submitted for publication in Canadian Journal of Public Health.

Fish Parasite Studies

Experimental studies on the effects of cold on helminth larvae of two species of food fish have demonstrated that minimum freezing conditions required to kill the larvae in situ vary with different species of fish. Plerocercoids of the lake trout, Salvelinus namaycush, were destroyed following 48 hours exposure at -6°C ; those of the whitefish, Coregonus larvaretus, were killed after 24 hours at -6°C .

In a preliminary survey of fish tapeworm larvae in food fishes of the lower Kuskokwim River, six widely-used fishes, including sharp-nosed whitefish, blackfish, 9-spined stickleback, burbot, pond smelt and river smelt, were found to be harboring these parasites. Plerocercoids of Pyramicocephalus phocarum were found in tomcod. The status of this tapeworm as a pathogenic agent for man is not yet known.

Examination of stool specimens from Eskimo residents of Chevak and Tunanak showed an infection rate of about 30% with Diphyllobothrium spp. Through special arrangements with PHS-DIH field personnel, cestodes were recovered for study from those individuals found to be infected. Platin cell counts of the coracidia thus obtained were used to establish species identification according to the method worked out by the AHRC aquatic biologist. On the basis of these host specificity studies, it appears that about 60% of the infections result from eating partially frozen or unfrozen stickleback, and about 40% from consumption of blackfish in similar states. Stool specimens obtained from 87 patients at the PHS hospital in Bethel showed an infection rate of 8.5%. Over half of these individuals were from the village of Newtok where stickleback are eaten routinely.

Platin cell counts of tapeworm specimens sent to AHRC from villages in western Alaska suggest that the majority of the infections came from eating blackfish and stickleback. Study of material from the villeges of Holikachuk, Andraefsky and Chukfaktoolik indicate that a new host species, possibly a species of whitefish, may be involved.

Housing Studies

A comprehensive interim report on results of test and performance records of the six experimental houses as compared to eight selected existing native houses is nearing completion. With the erection of Experimental House No. 5 at Kotzebue in the fall of 1958, no further housing construction has been undertaken pending

analysis of data now being accumulated. Experimental House No. 3. at Eek was modified by replacing the dried grass insulation with formed-in-place expanded plastic foam. Much less fuel was used during the past winter as a result of this change.

Waste Disposal Studies

Waste disposal studies, involving the use of experimental aerobic recirculating systems, have demonstrated that with careful supervision these units will operate successfully with a minimum of water. Experience to date indicates that a 500-gallon unit will serve 10 persons for at least six months without recharging.

The waste stabilization lagoon under study at Fort Yukon, functioned successfully through the second winter. No objectionable odors developed during the spring thaw. Several individuals and agencies have requested information on building lagoons in the vicinity of Anchorage and Glenallen. It is hoped that within the next few years a number of these installations will be available to permit more intensive study.

Two experimental privies of different designs are being installed in two native villages for use-testing under year 'round conditions. Arrangements have been made with a cooperating government agency to install a single privy incorporating the two different designs in one unit as a means of comparing frequency of use.

The 210 cubic foot composter constructed at Kasigluk did not prove successful. This experimental unit was lined with polyethylene plastic with the suggestion that only domestic waste and garbage be deposited in it. Through lack of understanding or carelessness, the natives dumped broken glass, tin cans and other refuse into the composter, damaging the liner.

Biochemistry and Nutrition Studies

The report of the ICNND nutrition survey is currently being compiled. The principal results of the survey are: 1) Biochemical and dietary evidence of low Vitamin A and ascorbic acid intakes; 2) No clear clinical evidence of these or other dietary deficiencies.

A study of the effects of supplementation of the diet with iron was made in the Bethel area. No general beneficial effects from such supplementation was evident, but there was definite benefit to women subjects with initially low hemoglobin levels.

Collection of data on food intakes among native groups in Alaska is being continued. Data already collected are being analyzed and transferred to punch cards for machine tabulation. Cholesterol levels of all adults and hemoglobin levels of all individuals in the study villages have been determined for comparison with dietary data.

Intensive laboratory study of the hereditary methemoglobinemia found in Alaskan Eskimos and Indians has shown the condition to be due to the lack of an enzyme, with the properties of a diaphorase, in the red cells of infected individuals. The enzyme from normal individuals has been purified and its properties determined. Parents of methemoglobinemic children have been found to have about half the normal level of this enzyme, thus indicating the detection of the "carrier" of this condition.

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 7

ACC. NO. [REDACTED]

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ADAK

Capt. Roland A. Merullo, Commanding

December 1959, January & February 1960

Fixed Frequency Backscatter

December 1959 - The equipment is not operational yet. Antenna elements are being assembled and installed. Bad weather continues to slow down completion of the antenna system.

January & February 1960 - The backscatter antenna has been completed with all elements installed. The equipment is expected to be in operation on or about April 1, 1960.

Ionospheric Physics

December 1959 and January 1960 - The ionosphere is following normal winter time trend. The daily maximum critical frequencies of the F layer are much lower than those recorded last year.

February 1960 - The ionosphere followed the normal winter trend with the exception of 18 February which showed a summertime condition with the appearance of Fof1 and low F layer criticals. There were no unusual disturbances during the period.

Weather Conditions

December 1959 - Total precipitation for month was 26.65 inches with snowfall of 24.6 inches and rainfall of 2.05 inches. Average wind velocity was 14 knots with maximum gusts of 73 knots on 21 December. Average temperature was 32°F with a minimum of 17°F on 14 December and a maximum of 35°F on 21 December.

January 1960 - Total precipitation for the month was 16.68 inches with snowfall of 13.7 inches and 2.98 inches of rainfall. Average wind velocity was 14 knots with maximum gusts of 78 knots on 7 January. Average temperature was 33°F with a minimum of 21°F on 31 January and a maximum of 45°F on 7 January.

February 1960 - Total precipitation for the month was 18.18 inches with a snowfall of 17.1 inches and rainfall of 1.08 inches. Average wind velocity was 14 knots with a maximum gust of 71 knots on 22 February. Average temperature was 33°F with a minimum of 13°F on 2 February and a maximum of 42°F on 22 February.

Personnel

December 1959 and January 1960 - There were no changes in the station complement during December and January.

February 1960 - SFC Robert J. Shaloo arrived 3 February to replace MSgt. Curtis F. Keirstead who departed 24 February for reassignment to USASRPS, Ft. Monmouth, New Jersey.

March 1960

Fixed Frequency Backscatter

The installation of Fixed Frequency Backscatter equipment is nearing completion. Due to unforeseen circumstances, completion of the project has been delayed. The anticipated starting date of 1 April 1960 has been set back to on or about 15 May 1960.

Ionospheric Physics

The F layer is approaching its normal summer time trend of dividing into F1 and F2 layers. Many measurements were still influenced by, or impossible because of lack of distinction between the layers. The E layer is appearing at an earlier time, which is a normal summer time trend. Complete absorption was observed 28 March from 0852Y to 1035Y time. Severe magnetic disturbances started 28 March, and continued on into the month of April.

Weather Conditions

Total precipitation for the month was 10.65 inches with snowfall of 9.0 inches and rainfall of 1.65 inches. Average wind velocity was 15 knots with maximum gusts of 79 knots on 24 March. Average temperature was 36°F with a minimum of 29°F and a maximum of 42°F.

Personnel

PFC Charles E. Goring reported for duty 29 March 1960.

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STATION CHARLEY

Status Report for November 1959
by
Dan Hale, Deputy Scientific Leader

Part One - General

On November 10, General Austin, Commander of the 11th Air Division, his staff and other associated officers, visited Station Charley and joined us for the evening meal. Two D'4/s with enclosed cabs were delivered to the station. S/Sgt. Dorsey and Justice, and Airman Gomez further distinguished themselves by the preparation of Thanksgiving feasts complete in every detail including pumpkin and mincemeat pies. Professor Hessler's east depth electrode, 0.42 kilometers from camp, made scientific history on November 27th, by functioning perfectly as polar bear recorder. The disturbance received on the instruments in Micromet Lab prompted the converging of a small army, armed with three rifles, ten cameras, several flash guns, and two tripods, on the electrode. Bear tracks and demolished equipment were much in evidence. Another wildlife note was the appearance of a few fish in the hydroholes.

Part Two - Personnel

Charles Chance, arrived around mid-November, to assist in Lamont's present program and to expand it by studies of marine organisms and temperature tolerance.

Part Three - Group Reports

USWB

November Statistics:

Average Temperature	-25.4°C
Highest "	-10.6°C on 11, 12th
Lowest "	-39.4°C on 24th
Average Barometric Pressure	30.276 inches
Highest " "	31.05 " on 13th
Lowest " "	29.66 " on 22nd
Precipitation	0.21 inches
Snowfall	2.1 "
Average Net Change Snow Depth	2. "
Prevailing Wind	East
Average Wind	8.8 knots
Fastest Wind	27 MPH from E and WSW on 26th
Average Sky Cover	6.1
Number of Days Clear	8
Number of Days Partly Cloudy	10
Number of Cloudy Days	12
Days, visibility of ¼ mile or less	3

Wattenburg

ONR Task NR 307-261

Earth Current Studies, Geophysical Institute, University of Alaska

A non-magnetic enclosure and control wiring for the Askania Magnetic Variograph was completed; and the instrument placed in operation after considerable difficulty with optical adjustments and drive mechanism for the clock. Reliable H and D traces are now being obtained. A non-magnetic enclosure for a transit compass was set up for declination measurements and to determine orientation of the floe in the interim between navigational fixes - in conjunction with the navigation program of the University of Washington.

Depth electrodes were lowered to, and data obtained, from a depth of 1500 meters. An as yet unexplained rapid fluctuation has occurred much of the time on the depth electrodes.

EW and NS earth current records were taken continuously throughout the month. All EW and NS Esterline Angus records have been scaled for hourly ranges of activity, the monthly average diurnal range for each direction, and total magnetude of the currents for October and November. Eight earth current storms have been scaled for minute to minute variations in both components, and hodograms plotted to show directional variation of the current during the storm.

Comparison of corresponding earth current and magnetic disturbances shows a much closer correlation between individual components than has ever been obtained at land based observatories.

V. P. Hessler

USAFCRC-Lamont Geological Observatory

The Lamont program has progressed satisfactorily in November. Daily seismic reflection shots for ocean depth have continued; however, the precision depth recorder was out of operation for twelve days. Seismic data indicates that the ocean bottom has been at around 1200 fathoms for the entire month.

The microbarovariograph, long period vertical seismograph, and the nuclear resonance magnetometer operated routinely throughout the month.

For accurate location of seismic shot positions, a program has begun of daily celestial navigation as close as possible to the time of the shot.

Charles Chance arrived at the station bringing Lamont personnel to three men. The Lamont oceanographic program is being expanded to include an investigation of marine organisms to aid in the interpretation of ocean bottom cores, and in the charting of bottom currents. Another aspect of the program will be an investigation of the Arctic Ocean's life potential as indicated by plankton concentration.

During November, Lamont conducted several dredging operations obtaining samples of mud, rocks, and biology from the bottom.

T. Herron, R. Willie, C. Chance

UNIVERSITY OF WASHINGTON

Micrometeorology

Routine observations during the month resulted in nearly 100% of the possible number for all program phases except wind speed and direction, which were about 75%.

At present the wind speed and direction unit is not operating due to trouble apparently in the interval timer; however, the possibility of a circuit fault elsewhere still exists. Efforts at repair will continue. Early in the month an accident made three of the anemometer cups unusable. New cups were ordered immediately, but have not been received.

Ice thickness at five of the six stations near the laboratory has showed no conclusive change; however, the sixth station, the site of a summer melt pond, has increased in thickness by 8 cm during the month. Its original thickness was about 2.7 meters; the original thicknesses of the other five stations vary from 1.9 meters to 4.5 meters. At present we have no adequate explanation for the steady increase of this station relative to the other five. Salinity measurements of ice cores taken in the area of the stations show little variation, all being of near zero salt content.

Snow accumulation has, as is usual, varied greatly among the eighteen stations; but overall shows an increase averaging about 3 cm.

Records from the water-level recorder show little change for the entire month in contrast to the decided increase in surface mass indicated by the October trace. This is further evidence for the hypothesis that the addition of 180 tons of air-dropped fuel oil during October is responsible for the increase observed, depression of the floe being of course only in the local area. Water level rose 0.06 ft. during November, which is to be compared with a 0.03 ft. water equivalent of snow accumulation.

A new source of data has been installed - a series of thermocouples, spaced five centimeters apart, under the ice (3.25 m. thick) with the top thermocouple at the ice water interface and the bottom thermocouple 50 cm down. This may permit a following of the temperature vs. freezing wave when the ice thickens. This installation is a joint venture between micromet and crystal fabrics.

Don Makela

Navigation

In so far as observational techniques were concerned, November operations were routine, and performed at temperatures as low as minus 39°C with winds up to 20 knots. However, investigation of theoretical methods other than lines-of-position were begun, e.g. shots of meridian and prime vertical passage. Runway orientation relative to the standard light was checked directly with the result justifying faith in our predecessors. Apparently low temperatures in the oceanographic lab are responsible for occasional stopping of the chronometer. A program for the measurement of magnetic declination was initiated to aid in the interpretation of earth current data.

	<u>November 3</u>	<u>November 30</u>
Latitude	77°31'	77°47'
Longitude	172°09'	172°42'
Runway Heading	N27.4E	N49.2E

Dan Hale
Austin Post

Oceanography

Carpentry on the hydrohale building during November resulted in the structure being relatively well sealed, the construction of a loft adequate to store all supplies inside, a more convenient arrangement of the interior, and the construction of a housing for the Herman Nelson Heater. The latter facilitates operation of the heater by protection from wind and snow; a light bulb on its carburetor makes starting relatively easy. Upon operation of the heater the necessity for further improvement became obvious as the heater was simply pumping its own exhaust gases into the well sealed hydrohale; an outside exhaust was provided immediately.

Coring operations were begun this month, and insofar as techniques are concerned, have been entirely successful. However, mechanical troubles developed with the second coring operation; specifically, the winch drum, while turning easily if unloaded, would jam under load. Examination revealed a broken bearing on the drive end of the shaft. A state of some emergency prevailed as the corer was only a few meters above the bottom, and the station was drifting toward shallower seas. Accordingly, the unbroken bearing from the other end of the shaft was placed on the drive end, and a wooden bearing constructed for the other end. This worked for about 900 meters, and then the winch jammed again against the drive end. Several hypotheses were proposed, none of them adequately explaining all the facts. However, in order to retrieve the corer, a lateral thrust bearing, at first wooden and then later made of part of the old broken bearing, was successfully used for a short period. The winch was again disassembled, and a ½ inch spacer ring on the drive end removed. This worked well for a while - then again side pressure toward the drive end developed and jammed the drum. This suggested the basic cause of trouble was spreading of the end bells of the cable drum, which was later confirmed. In order to effect repair, over 5,000 meters of line were hand wound off the drum; four pins were installed to hold the bells in line. Winch transmission was overhauled and the engine-transmission system realigned to permit usage of low gear, previously difficult due to wear on the bearings caused by malalignment.

A warm storage closet, heated by electric light bulbs, was built in the oceanographic lab, for the purpose of preventing a recurrence of the crippling freeze of October.

Experiments utilizing a thermocouple and a Leeds and Northrup Speedomax Recorder were begun with the object of obtaining very precise bathythermographs.

Dan Hale
Austin Post

Sea Ice Petrofabrics

The physical set-up of the new space allotted to ice crystallography was more or less completed - furniture, wiring, etc. Petrofabrics was done on several specimens of melt-pond ice, which was found to be coarse grained and to have two preferred orientations: viz. c-axis horizontal and/or vertical, both orientations sometimes occurring in the same specimen. For petrofabrics on sea-ice sections, which are finer grained and more complex, an enlarger would be necessary.

Sections of ice of various histories were examined and interesting features photographed. Twinning is highly correlated with impurities, perhaps organic in nature, and with microscopic texture - the latter being indicative of recrystallized sea-ice. One exceptional slide showed twinning (?) on a very large scale in melt pond ice. A layering similar to that called annual layering by Schwarzacher was found in several cores. Much of the ice exhibits odd, microscopic, symmetrical structures which are thought to be protozoa, or at least life of some type, though some of them may be abnormal "twins". None of the cores taken in November showed new ice freezing at the bottom.

Charles Knight

Prepared Station Charley
December 13, 1959

(Dan Hale, Deputy Scientific Leader)

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STATION CHARLEY

Status Report for December 1959

K. O. Bennington, Scientific Leader

Micrometeorology

The data for Calibration of the Dome of the Observatory - The data for calibration of the dome has been taken at a precise calibration but has not yet been worked out. This is not a serious neglect in that assuming the error to the azimuthal independent, such error is systematic resulting in expanding and contraction of the fix triangle rather than translation if the size used are near the same altitude and well placed. Frosting is not serious for a period of usage shorter than 20 minutes, if it becomes serious a hair dryer is on hand for frost removal. Drift trends for the month can be seen from the following:

<u>Date</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Runway Heading</u>
2 December 1959	77°37.6'N	173°00.4'W	N53.5 East
1 January 1960	77°13.2'N	167°18.7'W	N59.6 East

Oceanography

Experiments with thermoelectric bathythermographs has been discontinued for the time being. Results indicate that further work should proceed in the direction of devising a satisfactory raising and lowering system and of increasing response. The lowering problem arises from the desirability of avoiding slip ring contact in the circuit to the recorder. Wire angles of over 26 degrees curtailed operations during the early part of the month and caused us to leave one cast down overnight rather than risk damage to the bottles upon extraction. A new winch engine has been installed and the winch has been overhauled. Despite the departure of the Assistant Oceanographer around the middle of the month, as many stations were taken in December as in late October and November together, these months being periods of chronic breakdown. Inconsistencies in the chemical determination of dissolved oxygen in sea water may be due to contamination of reagents by atmospheric CO₂. B. T. depths continue to divert more than 10 percent from actual depth. A relatively spectacular rise of ocean bottom to between 500 and 600 meters on about 19 December inspired coring and dredging operations. Considerable difficulty in obtaining cores of reasonable length is apparently due to faulty check valve operation in the corer. Dredging proves quite interesting biological and geological aspects. While not a great amount of biological material has been collected, what has, comprises a great variety. This includes sponges, shells, starfish, a shrimp-like animal, lichen-like growth on rocks. Another interesting biological note is an apparently tame beast in the hydrohole that seems to like to be picked up. Geological material consists of shale, polish and fractured rock and something resembling petrified wood.

Crystallography

Petrographic work on banding in deteriorated sea ice has continued. Another project, originally attempted at ARL in March, has been reinitiated here. Samples of fresh water mixed with very low percentage of glycerin and indicator dyes, seeded with 1 mm. thick plates of slightly warmed and drained sea ice are encased to favor freezing from the top. The crystal orientation and platy structure appear to be continuous from the seed plate. The exsolved glycerin of high density containing much of the dyes was concentrated at the bottom of the container. Glycerin is chosen because of its mutual solubility relations with water, and its solvency influence on some dyes. Whether its hygroscopic nature is similar to that of hydrated salts in clean water and its influence on crystal growth of sea ice is yet to be determined. The technique offers promise of giving some insight into the mechanism of sea ice crystal growth.

K. O. Bennington.

C O P Y

C O P Y

U. S. to Airlift Scientists from Floe

New York Times, 1-8-60

Fairbanks, Alaska, Jan. 7 (AP) -- The air removal of twenty-nine civilian and military scientists was ordered today after the small drifting Arctic floe where they were stationed had begun to crumble.

One plane was sent to the floe, about 400 miles northwest of Barrow, Alaska, to take out the first group.

A spokesman at Ladd Air Force Base here said the camp, known as Station Charley, was in no immediate danger. Major Philip Peacock, public information officer, for the Eleventh Air Division, said the men would be removed a few at a time over a week.

The thirteen military and sixteen civilian scientists manning the station have been collecting meteorological and technical information on the Arctic. The camp was established last May. Personnel has been changed at regular intervals.

Major Peacock said information from the floe, which is part of the Arctic's drifting ice, indicated that no immediate break-up was feared. The camp radioed that the floe had begun to erode and conditions around it were "unstable." The runway scraped out by bulldozers last year was reduced from 5,000 to 3,700 feet, but was still long enough to accommodate the twin-engine C123J sent there today.

The scientific party is headed by Dr. Kenneth Bennington of the University of Washington, which has the contract to carry on research work begun in the Arctic during the International Geophysical Year

The aerial evacuation is the second from an Arctic floe in less than fifteen months. Twenty scientists were taken off pack ice near the North Pole in November, 1958, in a more urgent rescue.

Three staff members from Columbia University's Lamont Geological Observatory are in the group on Station Charley. They are Thomas Herron, 26 years old, Marquette, Mich; Charles Chance, 24, of Bergenfield, N. J., and Roy E. Willie, Jr., 23, of Bethesda, Md.

C O P Y

C O P Y

Monthly Summary, February 1960

Project Husky Activities Conducted at Arctic Research Lab.
(Max C. Brewer, Lab Director)

Point Barrow, Alaska
Kenneth O. Bennington, Scientific Leader

Following the withdrawal from Station Charley the equipment and instruments from the micro-meteorology and crystallography programs were repacked and shipped to ARL. Part of the oceanographic equipment was also brought to ARL, the remainder, the winch and related gear were returned to Seattle. All equipment has arrived at ARL and is either in use or is stored in the quonset hut which has been provided for the cold lab.

Micrometeorology
N. Thyer and J. Kelley

The parameters being measured at Eluitkak Pass are radiation: total incoming, net, short wave in, out over the ice and out over the ground, vertical wind and temperature measurements and humidity. General observations were made of the weather conditions during the day and the condition of the snow and ice.

Status of Equipment

Physical Plant - Two 5 kw gasoline electric generators were sent to Eluitkak Pass during the month to supply power for the micromet operation while the diesel generator was being repaired. The first generator became defective and would not operate continuously. The second generator developed trouble with the float valve and could not be depended on for continuous operation either. The result was a loss of much data.

The emergency generators were replaced toward the end of the month with the diesel which had been repaired. The power source is now constant and delivering a steady 115 volts and a steady 60 cycles. Our former difficulties with the diesel generator had been in the governor stage.

Six anemometer cables which had been buried under a snow drift four to five feet high have been dug out of the drift and directed to the anemometer test frame located on the northeast edge of the sand spit.

Snow was banked around all the buildings to prevent the wind from blowing under them.

Temperature - All temperature measurements are being taken as previously reported. The sea-ice-air series of temperature measurements are being taken. The thermocouples are located at a point in Eluitkak Pass 357 feet from the wanigan. The information is not as yet being recorded due to lack of recorder positions. This difficulty will be remedied in the very near future. The

thermocouples will measure the temperature at the following points: -240cm, -120cm, -90cm, -60cm, -30cm, -15cm, surface, +20cm, +40cm, and +50cm. All temperatures are relative to an ice bath. Since the ice thickness at this point is now approximately 119cm the -120 and -240cm thermocouples read the sea temperature and the remaining thermocouples read the ice temperature, surface of the ice-snow interface temperature, and the air temperature respectively. There will be a tide and current measuring station located nearby on the ice soon.

Wind Profile - Records have been taken on the Bendix Frieze anemometers as before, at heights 0.5, 1, and 8 meters. Tests have been started to compare accuracies of the various anemometers used in obtaining a profile. For these tests a special frame was built by the shop at ARL. It consists of two "A" shaped supports which hold an 11 foot horizontal bar six feet above the ground and oriented perpendicular to the wind direction. The anemometers are fixed at 18 inch intervals along the bar. The "A" frame is set up in a place where the wind comes in over an uninterrupted surface. This should give the same wind at each anemometer. In case there is any effect due to position on the bar each anemometer is moved along the bar one place after each test is completed. This is continued until each anemometer has been in each position on the bar. One anemometer is taken arbitrarily as the standard and the readings of the others are compared with it. Thus, a relative correction is obtained. Since the micromet project here requires good profiles rather than high absolute accuracy, this method should be satisfactory. Some tests have been completed on the portable anemometers. Testing of the anemometers for the photographic unit have not been done. The power supply has not been reliable until recently. As soon as the wind direction is suitable these anemometers will be tested. The photographic anemometer unit has been moved to the opposite end of the wanigan to facilitate ease of operation and testing.

Radiation - Up to now, all radiometers have been recording on one Brown recorder. This has 16 channels. The print wheel is numbered 1 to 8 so that channels 9 to 16 are also numbered 1 to 8 on the record chart. Channels 13, 15 and 16 are not in use and always give a reading corresponding to the zero input.

The recording arrangement in effect from February 29, 1960.

<u>Channel</u>	<u>Instrument</u>	<u>Polarity</u>
1	Agmet (net)	Incoming
3	Eppley short wave in	"
5	Kipp short wave out over water	Outgoing
7	Eppley short wave out over land	"
9	Band W total incoming	Incoming
11	" " " "	"

On February 28 it was noticed that the readings on channels 9 and 11 were of the wrong sign. A check showed that all of the other channels were correct.

During one windy period it was noticed that the input from the Agmet was undergoing violent and erratic fluctuations. These ceased immediately as soon as the power supply was shut off. The cause has not been definitely found. The cables to it are suspended above the ground on posts and the power cable hangs a few inches below the output cable. Suggestions as to the cause of the fluctuations have included potentials set up in the wires by bending, movement of the cable relative to the earth's magnetic field which is very unlikely, turbulence at the radiometer plate due to the interference of two airstreams, charged particles of drifting snow striking the apparatus somewhere and radiation from the power line. The instrument motor has been overhauled and no fluctuations have been observed.

Humidity - All humidity values were taken with the Beckman hygrometer. The values were not recorded due to switching difficulties.

General - Visitors to the Pass were: K. Bennington, C. Knight, W. Murcay, from Project Husky and F. Wiedeman from PS&D.

Approximately 1000 gallons of fuel oil are stacked at Eluitkak Pass.

Sea Ice Crystallography and Petrofabrics
Charles Knight

The physical facilities were set up in an unheated quonset hut early in the month. We found several old floes which are frozen in close to shore, within walking distance, so observations on old sea ice can be continued here. The mechanical stage attachment for the universal stage arrived, and works well. Some measurements on the "twinning" were made, and if there is a discrete crystallographic law involved, it will be difficult or impossible to detect, since the orientation differences are at or a little below the limit of reproducibility. It appears that what is involved is a phenomenon called small angle boundaries, and whether it can be called twinning when it occurs like this is doubtful. The boundaries have now been observed in all stages of formation, and apparently always originate at impurities. The impurities involved are chiefly brine bubbles (thus accounting for the completely "twinned" appearance of many of the crystals, since the bubbles tend to be more or less uniformly spaced) which sometimes assume a doubly-terminated, prismatic form, either due to the stress, or as negative crystals. The first stage of small angle boundary formation is the appearance of beautiful little strain figures around the bubble involved. The cause of the phenomenon is obviously the difference in expansion (or contraction) with changing temperature, of the impurity from the ice.

Some petrofabrics on the fan-like structures in quickly frozen fresh water ice have been done, and more is projected.

Sea Ice Crystal Studies
Ken Bennington

Work has been resumed at ARL on projects initiated on Station Charley. Excellent examples of banding in both Arctic pack and fresh sea ice have been found. Samples are being studied to determine relationships between the crystalline orientation and location of brines and the banding with these features further related to crystal development and deterioration.

The original growth characteristics in sea ice appear to be major controlling factors in its final deterioration although the persistence of inherited features is not yet clear. Preliminary work indicates that differentiation and brine expulsion during crystal growth is accomplished by both the increased density of the brine and the differential thermal expansion between the pure ice platelets and the brine layers. The brine layer does not expand at the same rate that the pure platelet contracts creating crystals that are internally stressed, and, correspondingly, zones of different stress in an ice floe, the degree of stress changing with changing temperature.

Observations of Atmospheric Emission in the Infrared
Wallace Murcay

The thermal emission spectrums of the atmosphere at Barrow was observed when conditions were suitable during the last three weeks of February. Observations were made by means of a Perkins-Elmer single pass monochromator with thermocouple detector and rock salt prism. No supplementary optics were used, the instrument being pointed directly at the sky through an open window at an angle of about 25° (elevation). This gave about 2.5 air masses optical path.

The site proved electrically noisy, probably because of the difficulty of obtaining a suitable ground, but reasonable records were obtained by using rather wide slit widths and consequently lower gain. Calibrations were accomplished by running on snow surface. Data have not yet been analyzed but preliminary calculations give an effective radiation temperature of the Ozone region of about -40°C, which is near that obtained by Adel in New Mexico. Water vapor emissions also show strongly in the spectrum, and CO₂ emission is probably also present in the records.

Oceanography
George E. Brayton

Upon arrival at ARL all instruments, the current meter, etc, were unpacked, inspected and tested to insure that they were in working order. Preparations and arrangements were made to assist and instruct the USNEL Group in current work.

Unfortunately ice conditions took a definite turn for the worse as far as safe plane operations are concerned and this work has all but ceased temporarily. ARL light plane patrols over the Chuckchi Sea indicate that ice conditions make work in that area impossible. Working out of Nome or some nearby base has been considered. While waiting for ice conditions to improve we have been experimenting with methods of operating current meters through the ice.

C O P Y

C O P Y

Department of Meteorology and Climatology
Project Husky

Project Husky Activities Conducted at Arctic Research Lab
Point Barrow, Alaska
Max C. Brewer DARL

Monthly Summary March 1960
K. O. Bennington, Senior Scientist - Project Husky

Project Husky activities continued smoothly throughout the month. A special project on evaporation and heat transfer from an open water surface was conducted during the month. The experimental set-up was as established in order to make additional observations at lower temperatures.

A warm period during the month very briefly delayed ice thin section work but no samples were lost.

In addition to the arrivals and departures of the micro-meteorology heat transfer studies group were the departures of Wallace Murcray on 2 March to complete infrared work at the Geophysical Institute, College, Alaska and George Brayton and John Dermody on 12 March to return to the University of Washington, Department of Oceanography.

Evaporation and Heat Transfer Studies

During the week from March 19 to 26 the regular micro-meteorology group at ARL from the University of Washington was augmented by six additional persons, making nine in all. For this period the routine observations were laid aside and a concentrated effort made to study a special problem, that of evaporation and heat transfer from an open water surface to cold air.

When the study was first contemplated, more than a year previously, it was thought that naturally occurring open leads could be used for the purpose. This would have required that men, instruments, power plant, and a fifty-foot tower be transported by light aircraft to each of two stations, one upwind and one downwind of the lead. It soon became apparent that this was unfeasible because of logistic difficulties and the uncertainty of wind and ice conditions remaining constant for a long enough period for the work.

A very suitable alternative proved to be the flooding of a pond on the sea ice about 3/4 mile north of ARL. Here it could be serviced with trucks and heavy equipment; also its size and orientation with respect to the wind could be controlled.

Prior to the scheduled tests many weeks of preparation had gone into design and construction of the instrumental array, both at Seattle and ARL. After 2½ days spent in setting up the equipment, the first flooding and measurements were made on Tuesday, March 22nd. A few flaws in procedure and instrumentation were noticed and corrected the following day.

For the rest of the week the experiment went relatively smoothly, so much that the radius of the pond was doubled from 10 m to 20 m for the final day's operation.

Measurements were made of wind, humidity, and temperature from two fifty foot towers, one upwind and one downwind of the flooded pond. Wind and temperature were also measured from a 12 foot mast in the pond. Visible and infrared radiation were measured at points over snow and over water. Temperature and humidity measurements clearly showed the transfer of heat and moisture from the water to air, and radiation measurements showed a significant difference between the net vertical radiative fluxes from snow and water surfaces. The evidence from the wind profile will require more careful analysis before their significance can be determined.

The University of Washington personnel directly connected with the test were Messrs. Thyer, Ross, Miyake, Kelly, Hansen, Fleagle, Dickinson, Deardorff, and Badgley. They were given immeasurable help by the administrative and technical staff of ARL.

F. I. Badgley

Report Observations: Eluitkak Pass

The parameters measured at Eluitkak Pass were radiation, wind velocity, temperature and humidity. General weather observations and the condition of the snow and ice were also reported.

Status of Equipment

Physical Plant

On March 1 and 2 we had two storms with winds measured at fifty-two knots at the Pass. No damage was done. All of the cables going to the various instrument stations were dug out of the snow and enough slack was given to them to prevent any breaks from developing.

Temperature, Wind, Radiation and Humidity

All temperature measurements are being taken as previously reported: at seven levels from 25 cm to 1600 cm, and a sea-ice-air temperature profile.

Wind velocity records were taken from the Bendix Frieze instruments while the precision instruments were being prepared for the pond experiment. Calibration of the precision anemometer transducers was continued at the Pass. After the period of the pond experiment all of the wind equipment was taken to the lab for maintenance in preparation for installation at Eluitkak Pass.

Radiation observations include total incoming, net, short wave in, out over the ice and over the ground, and net over the ice. The Kipp and Agmet radiometers were removed from the Pass when it was closed for the pond experiment. At the end of the month these instruments were still located near the pond station on the sea ice.

All humidity measurements were taken with the Beckman hygrometer and reported as parts per million water.

General

The station at Eluitkak Pass was closed down on March 17 so that all members of the project could devote a maximum effort toward preparations for the pond experiment which commenced on March 20, 1960. Dr. Fleagle, Dr. Badgley, Jim Deardorff, Mike Miyake, and Arne Hansen arrived at ARL on March 20. Norman Thyer, Don Dickinson, Dr. Fleagle, Dr. Badgley, Mike Miyake and Jim Deardorff left the station during the latter part of the week of March 20. Roger Ross will stay until June and Arne Hansen will stay until the pond experiment is over.

John Kelley

Sea Ice Crystallography and Petrofabrics

Work on the small angle boundary pattern in aged sea ice was completed this month. They have been examined and photographed in all stages of formation. Small angle boundaries and the appropriate preceding strain figures were artificially produced in ice thin sections in such a fashion that their postulated origin was shown to be correct. This material is being written up and a new project is being initiated.

Charles Knight

Sea Ice Crystal Studies

Work on the mechanism of brine expulsion during both crystal growth and deterioration was continued. Thermal expansion curves indicate that the temperature at which the thermal expansion of the entrapped brine is equal to the cumulative contraction of the pure ice platelets varies from -6°C to -20°C for salinities from 2 ‰ to 10 ‰ respectively. At constant conditions within this range a crystal is under a minimum of internal stress. The disproportionate expansion and contraction resulting from a fluctuating temperature encourage an expulsion of brine, the expulsion being limited by the tensile strength of the pure ice bridges. The varying internal crystal stress with its associated "Brine - Crystal" heat change provides a mechanism for sea ice purification. Channels are established for brine migration by both expulsion and the tendency to buoy up the mass after each added increment of newly formed ice. Brine expulsion or bleeding may also take place at the surface when a high concentration has been trapped and the thermal tensile stress is high

Ken Bennington

THULE

John A. Jones, Senior Field Representative

November 1959 - March 1960

The GRD Polar Research Facility continues to operate a research program at Thule, Greenland. The facility is located at the Northern end of the earth's magnetic dipole. The station is operated by three scientists; the gathering of data is continuous. The systems have been designed and improved by our personnel so as to insure that there will be no break in continuity. The project effort includes the following:

- a. Aurora and Airglow
- b. Radio Wave Absorption
- c. Sub-Audio Geomagnetic Fluctuations
- d. Cosmic Ray Monitor (Telescope)
- e. Neutron Monitor
- f. Satellite Recordings
- g. Precipitation Collection
- h. Radio Activity of Air Along 80th Meridian
- i. Satellite Tracking

Considerable effort has been expended during the period of this report to determine the necessity for relocation of the field site due to interference from new radar systems. As of this date, however, it has been tentatively decided that we shall remain at our present site for at least one additional year. The alternative to this plan is to relocate at Camp Tuto.

Comments pertaining to each project are noted as follows:

Aurora and Airglow

Photographs are taken of the entire night sky once every minute using an All-Sky "Fish Eye" lens. This operation is automatic. The films are processed at the facility and are scanned for any deviation from correct operation. A Patrol Spectrograph records the spectra of a 2° horizon-to-horizon slit of sky. Exposures of 20 and 100 minutes are made automatically during the night period. The operation of the Aurora and Airglow program has been quite successful and very interesting data have been obtained. The All-Sky Camera began operating during the dark season on 26 September 1959. It has been running without major difficulty. Several alterations were made which include the installation of a sequence timer and the replacement of the lens. The "year" and "duration of normal exposure" has been added to the data recorded on film. During this winter's dark season the camera has been operating for a minimum of sixteen hours a day. It is set to operate on an 85-20 exposure cycle, 20 seconds being the normal exposure. This sequence deviated slightly from the rate 70-20-5, but the 15-second extension on the long exposure has proven quite satisfactorily in detecting faint auroras of short durations which seem to be characteristic for this area. On 1 December 1959, the All-Sky camera was set for continuous operation; on 28 November 1959, the Patrol Spectrograph was set for continuous operation. A total of 19 auroral sequences during the period 8 December 1959 to 8 January 1960 were observed ranging in duration from a few minutes to several hours. These were

detected on the All-Sky camera films. The most outstanding of these displays occurred on the morning of 6 January 1960 when aurorae were seen in all four quadrants of the sky - the first observed occurrence this season of an aurora in the Northwestern quadrant. This event began at approximately 0543Z and was still prominent at 1330Z, at which time, it was reported to have a red coloration. Fifteen periods of auroral activity were recorded between 6-27 January 1960. Both the All-Sky camera and Patrol Spectrograph were set on discontinuous operation on 8 January 1960.

Radio Wave Absorption

A Riometer (Radio Ionosphere Opacity Meter) is in operation. A minimizing detector circuit has been modified to eliminate the effects of terrestrial transmitters and to improve the presentation of data.

Sub-Audio Geomagnetic Fluctuations

The 10,000 square foot loop of wire for vertical component detection was laid out in the snow by means of a Weasel. The problem of making splices at sub-zero temperatures was resolved, but there still exists the problem of keeping foxes from eating the cable. The analysis of the data is in progress. The appearance of a maximum in the frequency spectrum in the 7-13 c/band (one of the six frequency bands used in the analysis) is of considerable interest. This would appear to confirm the recently advanced hypothesis of a resonance of the earth-ionosphere system at about 9 c/s, one trip around the earth at the computed phase velocity in this system being about 1/19th of a second. This maximum usually did not appear at Denver which is often closer to the thunderstorm activity.

Cosmic Ray Telescope

This particular effort requires additional work on the equipment before satisfactory results can be obtained.

Neutron Monitor

The equipment continues to operate properly and excellent data have been obtained.

Satellite Recordings

The frequency channel of 1958 Delta II is still being recorded on a continuous basis. The satellite is no longer heard as frequently because its chemical storage batteries are now dead and it will transmit when only in sunlight. On 5 February 1960, the National Space Surveillance Control Center commended the personnel at the GRD Polar Research Facility for their observations which have proven to be extremely valuable to the NSSCC.

Precipitation Collection and Radio Activity of Air Along the 80th Meridian

These projects continue to operate without any problems.

Space Track Observations

Tracking data have been obtained for thirty-eight 1959 Kappa revolutions and forty-two 1959 Lamda revolutions.

General Notes

On 9 January 1960 a severe Arctic storm swept the Thule area for four hours with winds upwards from 70 knots and gusts exceeding 100 knots; there was extensive damage. The Jamesway tent housing our emergency generators, the convertors for the 60 cycle system and storage, was destroyed. Buildings capable of withstanding such severe storms are being provided to replace the destroyed buildings.

Sidney Kaufman, Project Scientist

FLETCHER'S ICE ISLAND (T-3)

1 January - 20 April 1960

Introduction

The abandonment of Station Charlie in January 1960 reduced the U. S. drift station program in the Arctic Ocean to the single research site, Bravo, on Ice Island T-3. The impact of this event upon T-3 activities was immediate. Accommodations and programs were enlarged to obtain a maximum in scientific observations and coverage from the station. Evacuated Charlie instrumentation and shelters that were needed in the expansion were transferred to T-3 to satisfy the requirement. Scientific personnel assigned to the island increased to a total of sixteen. Light planes, the Cessna 180, based at the Arctic Research Laboratory, Point Barrow, operated from the ice island for the first time to assist in the conduct of scientific programs. The upper air station removed from Charlie was set up on T-3, increasing considerably the quantity and quality of upper air data available from T-3. Nearly every phase of T-3 research comprising atmosphere, ice, ocean and crust of the earth was intensified during that period. Current plans are to continue the accelerated effort.

The Alaskan Air Command is responsible for the support and maintenance of the T-3 camp. Lt. Colonel Marshall G. Hassenmiller, who completed his tour as Camp Commander on 15 March, was replaced by Captain William E. Cohagen. Military support personnel assigned to the island total fifteen.

Space allocation to scientific personnel was set at a maximum of sixteen, during the 15 March to 15 May period because of the need to accommodate installations personnel who will remove the camp buildings from their ice mounds during this period. When relocation and rehabilitation of the camp is completed in early May, it is anticipated that accommodations will be available for 22 - 24 scientists over the summer season.

The Geophysics Research Directorate, Air Force Cambridge Research Center is the focal point for administration and coordination of the scientific programs. Participating research organizations in addition to GRD are the U. S. Navy Office of Naval Research, Bureau of Ships, Underwater Sound Laboratory and Arctic Research Laboratory, the Arctic Institute of North America, Lamont Geological Observatory, U. S. Weather Bureau, University of Southern California and Pickard and Burns Research Engineers.

Scientific Personnel

*Mr. Roger Lewis, Marine Biologist, Scientific Leader (Jan-March 1960)

Dr. Kenneth Hunkins, Geophysicist, Scientific Leader (April -)

*Mr. Harold Smith, Meteorologist
*Mr. W. Gale Biggs, Meteorologist
Mr. Oliver Wattenbarger, Meteorologist
Mr. Donald Keller, Meteorologist
Mr. William Graham, Meteorologist
Mr. C. D. McKenny, Meteorologist

*Dr. Robert Mellen, Physicist
*Mr. Carl Milne, Underwater Sound Specialist
*Mr. Elton Kelley, Underwater Sound Specialist
*Mr. Edward Democh, Underwater Sound Specialist
*Lt. Commander Beaumont Buck, USN, Underwater Sound Specialist
Mr. Richard Stey, Electronicist
**Mr. Jiro Maguruma, Physicist
Mr. Keiji Higuchi, Physicist
*Ensign Leonard LeSchack, USN, Geophysicist
Mr. Henry Kutschale, Geophysicist
Mr. Thomas Herron, Geophysicist
Mr. Gerry Cabaniss, Geologist
Mr. David Craven, Mathematician
Mr. Lawrence Smith, Electronicist
Mr. Robert Lovenberg, Marine Biologist

*Tour completed within report period.

**On leave for seven weeks commencing 15 March 1960

Research Program

Navigation

Located on 2 January 1960 at 71°02'N, 144°55'W, the island moved to 71°45'N, 157°10'W by 17 April. Drift during January was negligible. In early February, the island began to move rapidly west, travelling approximately 225 nautical miles to its current location, just 30 miles north of Point Barrow, Alaska.

Meteorology:

The observational program in meteorology conducted by the U. S. Weather Bureau was temporarily discontinued on 15 January due to a shortage of funds to operate the program for the balance of the fiscal year. The abandonment of Charlie, however, permitted the resumption in late January and early February of the total program including the three hourly synoptic observations, radiation and other specialized meteorological studies as well as the expanded upper air program.

Oceanography

The oceanographic program continued uninterrupted. Hydrographic stations were taken twice each month. Water samples were collected at each depth for chemical analysis. A bathythermograph was lowered every second day to obtain the profile of ocean temperatures. Unusual temperature variations were observed in the surface layer during periods of rapid island motion. The "Pacific Interlayer" which is characterized by a sharp increase in temperature at the 75 meter depth was also evident in the records.

Submarine Geophysics

Ocean depths spanned a broad range during the report period, varying between 75 - 3000 meters as the island drifted over the continental shelf. Seismic reflection methods were used to determine ocean depths and sub strata layering. An intensive survey by seismic refraction methods of the depth and character of the earth's crust in the region of T-3 was initiated in early March. Seven pack ice landings were made in April by the ARL Cessna 180's in support of the investigation and highly successful recordings of refracted explosions were obtained. The area covered in the initial survey was about twenty miles south of the camp and thirty miles to the north. A supplementary gravity survey across the continental margin was also conducted in an additional flight. Weasel traverses from the T-3 camp to one end of the island have also been made to obtain further refractive data through the shallow waters.

The geophysical program was seriously impaired by two costly fires in January and April which totally destroyed each time the seismic laboratory and installed equipment. The loss in scientific equipment is estimated to be at least \$70,000.

Although the fires temporarily halted the seismic reflection program, depth soundings continued by using a two channel dynagraph connected to a hydrophone and chronometer.

Gravity

The North American Gravity Meter was read at the station daily. In addition, continuous photographic recordings were made of the gravity readings in order to study long period oscillations which may be due to tidal effects, etc.

Magnetics

Observation of magnetic declination continued through the period. An Askania variograph on loan from the U. S. Coast and Geodetic Survey was installed. A nuclear precession magnetometer was also added to the instrumentation.

Ice Physics

Ice cores were taken from old sea ice and various types of island ice. The analysis of the cores has included chlorinity titrations, visco-elastic measurements and crystallographic examination. Unusually large single crystals of ice have been found in an area midway between the camp area and Colby Bay. Grains measured twenty centimeters or more in diameter as compared to the usual diameter of one centimeter or less.

Marine Biology

Bottom samples showed a consistent marked increase in the number and types of fauna during this period. A microscopic examination of some samples was performed. Several species of forams were collected in sufficient quantities to permit isotopic analysis. Water samples for paleo-temperature corrections were also taken to accompany the foram collections. Plankton hauls at depth intervals of 100 or 500 meters were made and the results were very satisfactory

International

USSR

In the second half of March the Arctic and Antarctic Scientific Research Institute will send still another expedition to the Arctic. It will establish 15 automatic radio meteorological stations on drift ice in the Leptev, Kara, East Siberian and Chukchee Seas.

B. Kremer, Chief of the Scientific Section of the Main Administration of the North Sea Route, in reviewing work in the Arctic during the last six years, points out that the "Severnnyy Polyus" scientific stations have drifted a total of more than 28,000 km. About 55,000 meteorological and actinometric observations have been made at the drift stations, more than 10,500 radiosondes and pilot balloons have been sent aloft, and the depth of the Arctic Ocean has been measured at almost 7,000 points.

The present station, "SP-8," commanded by V. Rogachev, was organized in April of last year by the expedition "Sever-11," commanded by M. Nikitin, a participant in all high latitude expeditions since 1948. Although the actual route followed by the drift station was 2,360 km, it moved only 380 km in straight course, because it followed a highly tortuous route.

In regards to the research program of the drift stations in 1960-61, the expedition "Sever-12," will relieve the personnel at the station "SP-8" and organize still another drift station, the "Severnnyy Polys-9." M. Nikitin, Candidate in Geographical Sciences, will again head operations.

The new station is to be organized to the northeast of the New Siberian Islands, approximately in the area of 79-81°N and 140-160°E. All types of work previously accomplished on the "SP-8" will be continued at that station. The same types of work will be accomplished on the "SP-9," with the exception of geophysical research. The two drift stations will be headed by the young but experienced oceanographers N. Vlinov and V. Shamont'yev.

The expeditions and drift stations are supplied with the latest apparatus and instruments. Life for the polar specialists will be a little easier; they will now have electric stoves for cooking and central water heating for the huts, supplied from the diesel generators of the power plant.

The expedition will be supported by an aviation detachment under the command of the well-known polar flier P. Moskalenko. ("To the High Latitudes Again," by O. Stroganov, Moscow, Izvestiya, 28 February 1960, p. 3).

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COMMITTEE ON POLAR RESEARCH

Arctic Status Report No. 8

NOTE: This report contains information obtained from the Air Force, Army, Navy, and other sources. Courtesy requires our respecting the prior rights of these sources with respect to public dissemination of information intended for private use. Accordingly, contemplated further dissemination or publication interests should be discussed with the original source or with the Secretary of the National Academy of Sciences' Committee on Polar Research

ADAK

Capt. Roland A. Merullo, Commanding

April - September 1960

Weather Conditions

April 1960 - Total precipitation for the month was 13.11 inches with snowfall of 12.9 inches and rainfall of 1.02 inches. Average wind velocity was 12 knots with maximum gusts of 42 knots on April 21. Average temperature was 35°F with a minimum of 24°F and a maximum of 43°F.

May 1960 - Total precipitation for the month was 5.09 inches with snowfall of 2.0 inches and rainfall of 3.09 inches. Average wind velocity was 13 knots with maximum gusts of 53 knots on May 10. Average temperature was 39°F with a minimum of 33°F and a maximum of 46°F.

June 1960 - Total precipitation for the month was 1.43 inches. Average wind velocity was 9 knots with maximum gusts of 41 knots on June 12. Average temperature was 43°F with a minimum of 37°F and a maximum of 52°F.

July 1960 - Total precipitation for the month was 3.04 inches. Average wind velocity was 10 knots. Average temperature was 49°F with a minimum of 42°F and a maximum of 61°F.

August 1960 - Total precipitation for the month was 3.04 inches. Average wind velocity was 11 knots with maximum gusts of 49 knots on August 9. Average temperature was 50°F with a minimum of 45°F and a maximum of 61°F.

September 1960 - Total precipitation for the month was 2.49 inches. Average wind velocity was 11 knots with maximum gusts of 61 knots on September 26. Average temperature was 48°F with a minimum of 39°F and a maximum of 63°F

Ionospheric Physics

April 1960 - Severe magnetic disturbances which started March 28 continued on up to April 4. Complete absorption was observed April 1 at 0600, April 4 at 1400, and April 30 at 0600. There were many disturbed periods during the month and recordings obtained were unusual in many respects. The F layer has very nearly approached the summer trend of dividing into F1 and F2 layers, with relatively low values of critical frequencies being measured for F2.

May 1960 - The F layer has reached its summer trend of dividing into F1 and F2 layers with the daily critical frequencies remaining below 10 megacycles. Occurrence of Sporadic E has been high with strong returns of "c", "h", "l", and "f" types.

June 1960 - The F layer is following the normal summer time trend of dividing into F1 and F2 layers with daily critical frequencies remaining below 10 megacycles. Absorption of F1 and F2 layers was observed quite frequently during the month. Occurrence of strong returns of Sporadic E has remained high. One instance of "a" type Sporadic was observed June 9 and "s" type sporadic was observed on the 3rd, 9th and 26th of June.

July 1960 - The F layer is still in the normal summer time trend of dividing into F1 and F2 layers. Sporadic E activity continues high with all types normal for this area being observed. Blanketing of F1 and F2 layers was observed quite frequently during the month with spread of the F layer trace occurring during the early morning hours.

August 1960 - The F layer is beginning to show signs of the approach of the fall. Critical frequencies have slightly increased in diurnal maximum, and separation of the F1 and F2 layers occurs less frequently with use of the symbol "L" for the F1 and F2 layers prominent throughout the second part of the month. Sporadic E activity continues high.

September 1960 - The daily trends observed on ionograms gradually change as winter approaches. The E layer appears later and disappears earlier, separation of the F1 and F2 layers occur less frequently, and the daily critical frequencies of FofF2 is increasing in diurnal maximum. Sporadic E activity continues high.

Projects

April 1960 - Elements for low frequency antenna arrived April 29, 1960. Projected starting date of May 15, 1960 is anticipated.

May 1960 - The Fixed Frequency Backscatter Program is not yet underway. Final tuning and adjusting continues with the hope that equipment can be made operational in the very near future.

Personnel

April 1960 - SP5 Hudick and SP5 Ryan departed for USASRPS, Fort Monmouth for reassignment. PFC Michael Babcock arrived April 26, 1960. All station personnel were awarded proficiency pay effective April 1, 1960.

May 1960 - SFC Shaloo was promoted to grade E-7, SP4 Nuttycombe to grade E-5 and PFC Goring to grade E-4. PFC Bowman and PVT Beckum arrived May 27, 1960.

June 1960 - SP4 Poirier and SP4 Truedson departed June 11 for reassignment to Fort Monmouth, New Jersey. SP4 Greene arrive June 7 and SP4 Morley arrived June 17, 1960. SP4 Li was promoted to grade E-5 and PFC Babcock to grade E-4.

July 1960 - SP4 Greene was promoted to grade E-5.

August 1960 - SP4 Morley was promoted to grade E-5, and PVT Beckum was promoted to grade E-3. SP5 Greene departed August 6 for CONUS for 30 days emergency leave.

September 1960 - PFC Bowman was promoted to grade E-4. SP5 Li departed September 13, 1960 for reassignment to Fort Monmouth, New Jersey. SP4 Ernest arrived September 9, 1960. SP5 Greene returned from emergency leave September 9, 1960.

AFRD WEEKLY ACTIVITY REPORT - 29 July 1960 (COPY)

GRD - Geophysics Research Directorate

TERRESTRIAL SCIENCES LABORATORY

Launching of Expeditions and Major Field Projects

Three Arctic field expeditions were initiated by the Terrestrial Sciences Laboratory during May. These parties are investigating areas of the Canadian Ellesmere Island, Greenland, and Alaska in order to learn more about their environmental properties, natural terrain, and capability to support aircraft operations.

A party of 18 scientists was established at Ellesmere Island during late April and early May. The scientific program was immediately initiated with installation of thermocouples in the ice and meteorological equipment on the surface. A survey of triangulation was started and a seven-mile grid of elevation and ablation poles was established extending from the mainland to the edge of the ice shelf. One of the purposes of the survey is to determine if the shelf is slowly spreading under its own weight, with expected measurements of as little as $\frac{1}{2}$ inch. Snow accumulation studies at 50 locations have been initiated and 90 ice core samples returned for analysis of crystal structure and correlation with temperature profiles. An intensive gravity study was started by Mr. Francis Crowley of the Terrestrial Sciences Laboratory to supplement last year's seismic survey.

On 2-5 May a party of 10 scientists, headed by Mr. Stanley Needleman of the Terrestrial Sciences Laboratory, was placed at Centrum Lake, N. E. Greenland. The party initially will study the ice structure of the lake and regional geology and, following the melt period, will conduct detailed studies of the natural ice-free land to select and prepare an airstrip. Test landings of a C-130 aircraft will occur in July.

A four-man party with 50,000 lbs of equipment was airlifted into Lake Peters, Alaska, on 3 May, and their program of lake studies, regional geology, and meteorological studies was initiated. The investigations will continue throughout the summer.

Information has been received from the drifting ice island, T-3, that a portion of the island, $2\frac{1}{2}$ miles in length and 2 miles wide, has broken off. A landing by an Arctic Research Laboratory aircraft on the "new" island revealed 2 craters had appeared. These evidently were caverns or underground rivers whose roofs had collapsed as a result of the breakoff, leaving holes 25 feet deep and clearly showing the stratification of the ice. The ice island is currently in 170 feet of water at position $71^{\circ}51'N$, $159^{\circ}44'W$, about 65 miles northwest of Pt. Barrow, Alaska. This has been the first break observed in T-3 since its initial location in 1947. The seismic refraction program for determination of the earth's crustal structure north of Alaska is being continued on T-3 and 5 explosions have been detonated for recording.

Capt. Robert A. Gray
Acting Chief
Terrestrial Sciences Lab.

NEW YORK TIMES - October 16, 1960

Copy

ARCTIC FLOE USED AS RESEARCH BASE - Navy Scientists Go Abroad on Ice Island 180 Miles Inside the Polar Pack.

Kodiak, Alaska, Oct. 11 (Reuters) - A new scientific research station for a group of Navy scientists has been established on a lonely floe riding the currents of the Arctic Ocean.

The Seattle-based icebreaker USS Burton Island "docked" beside the floe Sept. 8. She began unloading and setting up the equipment for the station, designated "Arlis One." Two days later the United States flag was raised over the campsite.

"Everyone on board was determined to make this, the first ice floe camp established by ship, a complete success" said a spokesman for headquarters of the Seventeenth Naval District here. "It was an astonishing transformation of a barren ice floe into a site for Arctic research."

Speedy Operation - At the time of the flag-raising ceremony the station's ten buildings had been completed and equipped with electric light and water and oil heaters to make the interiors comfortable. Food and equipment had been stored, machinery and radios were in operation and even the bunks had been made up.

With the ship's company divided into three shifts to work around the clock, the desolate floe had, by the next morning, begun to take on the appearance of a scientific camp.

The scientists moved from the ship into camp the following day.

An example of what the conditions will be like on the floe came when the unloading efforts were slightly hampered by a "white-out" - an Arctic phenomenon on which cloud and snow color-match so closely that the horizon seems to disappear.

Ice Island Arlis One is about 420 miles northeast of Point Barrow and 180 miles inside the Arctic polar ice pack.

The operation to establish the research camp was initiated by the Office of Naval Research in Washington and planned by the Alaskan Sea Frontier here with the assistance of the United States Arctic Research Laboratory.

Suitable Floe Chosen - To provide on-the-spot coordination in choosing a suitable floe Dr. Max Brewer, director of the Arctic Research Laboratory, sailed on the Burton Island, which is commanded by Cmdr. Griffith C. Evans.

Dr. Brewer and Dr. Kenneth Bennington, a specialist in petrofabrics of sea ice, made a reconnaissance flight from the ship. When the choice of a floe had been made the Burton Island threaded its way through narrow leads in the pack ice and frequently had to smash through heavy ice to negotiate the final twenty miles to the site.

The six scientists on the floe are led by Dr. Bennington, who is on the research staff of the University of Washington, Seattle. The others are Charles Knight, an expert in the crystal orientation of sea ice; George Brayton, an oceanographer; Renold Hansen, a micrometeorologist; Robert Ditzler, a micrometeorologist and radio operator, and John Tibbs, a marine biologist. Frank Akvik, an eskimo, has the job of camp maintenance. Three to five more men will be stationed on the floe.

USSR

(Izvestiya, March 17, 1960)

The first three planes of the polar service of the Civil Air Fleet took off from an airdrome near Moscow for flight to the Arctic. They will deliver the first group of scientists, and part of the freight and equipment of the expedition "Sever-12" to initial Arctic bases.

The aviation detachment of the expedition, consisting of more than 15 aircraft, will have grave responsibilities. The airmen are to accomplish the replacement of the personnel of the drift station "Severnny Polyus-8" supply its new personnel with all they need until autumn and establish a new drift station "Severnny Polyus-9." In addition, the two aircraft, equipped with ski-type under-carriages, will set out automatic radio-meteorological stations and radio beacons for determination of the movement of ice along the course of the Great Northern Sea Route.

(Pravda, September 22, 1960)

The expedition "Sever-12" headed into the Arctic from Leningrad on 21 September. It is headed by N. Tyabin, Candidate of Geographic Sciences, the experienced polar explorer who is director of the scientific research observatory at Tiksi.

Two stations are drifting in the Arctic at present, the "Severnny Polyus-8" and the "Severnny Polyus-9." The new expedition will supply these daring high-latitude explorers with all that is needed for the winter period.

**SCIENTIFIC ACTIVITIES AT
FLETCHER'S ICE ISLAND (T-3)**

15 April to 25 September 1960

21 October 1960

**Geophysics Research Directorate
Air Force Cambridge Research Laboratories
Air Force Research Division
Air Research and Development Command**

Fletcher's Ice Island (T-3)

Introduction

The outstanding events of the period of this report were the break-off from T-3 of a large triangular shaped piece about 3.5 square miles in area, with subsequent smaller breaks; and the grounding of the island on 22 May at 71°50'N, 160° 20'W, a location approximately 80 miles WNW of Point Barrow.

The major fracture of the island is believed to have occurred on 5 May. However, no vibration was felt at the camp and personnel had no knowledge of the break until a visiting aircraft flew over and made the discovery. The first, and largest, piece broken off later subdivided into a number of pieces. Small pieces have been seen as much as twenty miles from the island, evidently left behind as T-3 drifted.

The ice island remained at its initial grounded location from 22 May until 16 July when favorable winds brought about a drift of 6 miles to the southwest, then 9 miles east-northeast. From this point it then drifted 12 miles in a generally westerly direction and on 29 July was back to its original grounded position where it has remained until the present.

A combination of shallow water, lack of drift, high temperatures and extensive summer melt greatly curtailed the seismic reflection, oceanographic, marine biology, gravity and ice physics programs. However, it was thought too soon to abandon the camp this fall as drift may occur this winter.

The planned fall and winter program has been oriented toward a non-drifting station with a concentration of effort on such things as a seismic study of long period surface waves in an ice-covered ocean; seismic studies of changes in physical constants of ice with change in temperature; seismic refraction studies of the crustal structure beneath the ocean floor; micro-seism recordings; study of ice island oscillations as indicated by gravimeter; continuing ice physics studies; continuing meteorological and micro-meteorological studies; operating an All-Sky camera for aurora studies; and recording total magnetic intensity with a nuclear resonance magnetometer.

The scientific compliment is eight for the period October through December. After 1 January 1961 the Weather Bureau program will be discontinued and the scientific personnel will be reduced to two geophysicists of Lamont Geological Observatory, jointly sponsored by GRD and ONR.

During the period of this report the U. S. Navy Office of Naval Research sponsored marine biology through a contract with the University of Southern California and supported the U. S. Weather Bureau participation. The Geophysics Research Directorate, Air Force Cambridge Research Laboratories sponsored the ice physics, oceanographic, and micro-meteorological studies through a contract with the Arctic Institute of North America; while navigation, gravity, magnetics, tidal measurements and T-3 surface studies were accomplished by personnel of AINA and GRD. The U. S. Navy Underwater Sound Laboratory conducted sound propagation studies.

Mr. Gerry Cabaniss, geologist, GRD, was scientific leader, with other personnel as follows:

Mr. David Craven, research associate, AINA
Mr. Robert Lavenburg, marine biologist, USC
Mr. George Razevich, meteorologist-in-charge, USWB
Mr. Robert Walker, meteorologist, USWB
Mr. Warner Chapman, meteorologist, USWB
Mr. John Barter, Meteorologist, USWB
Dr. Keiji Higuchi, physicist, AINA
Mr. Jiro Muguruma, physicist, AINA
Mr. Peter Larsson, micrometeorologist, AINA
Dr. Robert Mellen, physicist, USNUSL
Mr. Carl Milne, underwater sound specialist, USNUSL

Navigation

From 15 April until the ice island went aground on 22 May, 34 locations were determined. Stellar fixes are accurate to 0.2 mile and most solar fixes to a 0.5 mile.

The true orientation of island reference azimuth was determined for each fix. These observations showed an island rotation of 75° in a counterclockwise direction between 11-15 April; 25° in the same direction on 3-4 May; then a reversal of several degrees on 5 May. This is believed to correspond to the approximate time of the major break. There were also periods of considerable rotation, with several reversals, each time the island ran aground (22 May and 29 July).

Gravity

Relative gravity values were obtained at least twice daily from readings of the North American gravity meter. Ties were made to the pendulum station at Ladd Air Force Base, Fairbanks, Alaska. Additional readings were taken as the island drifted up over the continental shelf.

Early in July and again in the middle of August, gravity observations were made every two hours in an effort to detect tidal oscillations. The amplitude of tidal oscillations was so small that observable changes in gravity were not great enough to delineate the curve.

Magnetics

The magnetic compass was read daily to determine magnetic declination. During periods of rapid island rotation, compass readings were made concurrently with celestial navigation shots to permit accurate corrections.

Tidal Measurements

For two short periods in the latter part of the summer, direct measurements of tidal oscillations were made at Colby Bay. Each time a $3/32$ " cable was anchored to the ocean bottom by a heavy (300#) weight and passed through a pulley fastened to an A-frame on the ice. A twenty-pound weight attached to the free end of the cable maintained constant tension even though the ice often rose and fell with the tide. Changes in water level were referenced to a marker fastened to the cable. Readings were taken every two hours, except for 4 a.m. LST.

Although the data are sparse, it is evident that the area has a "mixed" tide with a tendency toward semi-diurnal fluctuations (two high and two lows per lunar day). The maximum diurnal range measured was seven inches.

The gage cable was lost toward the end of August when the Colby Bay sea ice moved out and again when the island moved 50 or so feet in September.

Submarine geophysics

During the time prior to grounding and for the short period of drift in July, seismic reflection techniques were used for determining bottom and sub-bottom depths and attitudes.

The Lamont refraction program terminated in early May with the departure of the last Lamont scientist. Ten successful landings on the pack as far as 35 miles from the island had been made and refracted waves received from most of the stations. About fifteen surface traverses to distances of six miles were also successful.

Oceanography

Standard oceanographic stations were occupied every week to ten days during periods of island drift, with only sporadic stations during times when the island was stationary.

An interesting fact noted in the shallow water overlying the continental shelf was the rise in silicate-silicon content. This increase was interpreted to be the result of turbulent mixing of bottom sediments caused by the passage of the island.

The effects of meltwater run-off were noted to a maximum depth of 15 meters at the height of the melt season. Mixing with the more saline waters progressed very slowly because of the presence of the island.

Hydrology

Two current gaging stations were established and current velocity and bottom profiles taken every three days for the first month of the melt. In addition, measurements were made every two hours over a 24-hour period at one of the stations. Stream bed ablation was measured daily for a two-week period.

Measurements of water temperature and depth, and air temperature were made every two hours on some clear days. An apparent two-hour lag of maximum water depth to maximum air temperature was noted. Temperatures were measured to 0.01°C with deep sea reversing thermometers.

Ablation measurements

Ablation measurements were made at intervals of 7 to 10 days at two sites used in 1958. Two new profiles of 10 stakes each were placed across a section of pronounced ridge and trough topography. In addition, readings were made daily at several stakes near the micromet station.

Approximately 6 meters of ice have been lost since September 1953 near the old camp. The average ablation of ice for the summer of 1960 was 1.8 meters.

Micrometeorology

Standard micrometeorological parameters measured were air temperature and wind speed profiles, total and short wave incoming radiation, ice and snow albedo, ice temperatures, and evaporation.

No results are yet available.

Ice physics

Studies of candled ice, old sea ice and stratified ice were continued. Over 400 axial determinations of candled ice were made, and further studies indicated that a piece of candled ice is almost invariably monocrystalline.

Deteriorations of elastic properties, such as Young's Modulus and internal viscosity of various types of ice were carried out. Variations of these properties with temperature constituted a major part of the studies.

The big event of the season was the successful coring of a hole through the island. The entire core was retrieved. Ice thickness was about 113 feet. Another core was obtained through the island near Colby Bay where the ice was 30 feet thick. The heavy dirt layer found at 90 feet and other depths near the old camp and outcropping near Silk Hill was not present in either of the two cores obtained near the new camp.

Studies were also made on samples of "basement" ice (Marshall), with strong stratification in the Colby Bay region. A surprisingly large number of specimens showed basal planes parallel to the "bedding" (stratification) planes. This ice also exhibits a gently folded pattern, a series of synclines and anticlines sub-parallel to the edge of the island.

Marine biology

The main research objective of the project was the measurement of plankton productivity from the fat analyses of the Amphipoda. However, these were quite rare in the shallow waters of the shelf; so research was directed along other lines.

Vertical plankton tows and "orange peel" bucket bottom samples were taken at various intervals. A small locally-constructed bottom dredge was used when the island moved. Numerous surface collections were also made.

No plankton "bloom" was seen this summer, probably because of the large amounts of fresh water running from the island, and poor circulation because of the presence of the island.

Meteorological Observations

The observations carried out by U. S. Weather Bureau personnel during this period consisted of surface synoptic observations every three hours, upper air soundings twice daily, and surface albedo measurements,

ARCTIC HEALTH RESEARCH CENTER

ANNUAL REPORT OF PROGRAM PROGRESS
July 1, 1959 - June 30, 1960

I. PROGRAM TRENDS AND HIGHLIGHTS

Entomology

Dr. William C. Frohne left AHRC in February, 1960, to accept an ICA assignment to Ethiopia, after 12 years as Chief of the Center's Entomology Section. For almost two years during his AHRC assignment (1957-1958) he was on loan from PHS to WHO on assignment to the Philippines. Dr. Frohne's painstaking labors in carrying on surveys and biological studies of Alaskan mosquitoes have resulted in the publication of twenty-seven papers and notes during his tenure at AHRC. His section produced a total of 46 papers during these years.

Efforts are being made to locate a replacement for him interested in the vector-host relationships of biting insects to complement the work of the epidemiology and animal-borne disease groups for exploratory studies in this field. A number of entomologists have expressed interest in work in Alaska, but no final decision has been made.

In collaboration with Rocky Mountain Laboratory, Hamilton, Montana, AHRC investigators are now doing the first phase of a search for (Arbor) viruses in Alaska. This first phase is being directed toward determining the extent of the involvement of migratory birds in their summer breeding habitats. Exchange visits have been made between AHRC staff and those of Rocky Mountain Laboratory and the Encephalitis Station of CDC at Greeley, Colorado, in connection with development of this project.

Epidemiology

Extensive review and discussion of the AHRC epidemiology program, assisted by Dr. Dorland Davis and Dr. Edward Lennette, resulted in redirection for greater emphasis on field and laboratory investigations of disease outbreaks and endemic diseases in Alaska. Serology as a tool of epidemiology is being used increasingly, with substantial assistance from Rocky Mountain Laboratory. Serologic evidence of tularemia is found to be widespread among Eskimo and Indian men from all over interior Alaska. Brucellosis is known to occur among caribou-eating groups.

Dr. Karl R. Reinhard transferred to NIH at the end of the fiscal year, leaving the virology laboratory without a chief. Recruitment is underway. Virological work will continue, but will be reduced in scale to a supportive role for field investigations.

Environmental Sanitation

Environmental sanitation studies have been reviewed during the past year during visits to Alaska by Mr. W. W. Towne and Mr. James Coulter from the Sanitary Engineering Center, Cincinnati, and as a result impetus has been given to work on sewage lagoons and other possible methods of waste disposal. Opportunity to include truly arctic areas in sanitary engineering studies has developed for PHS. Consideration is being given to an interagency agreement which would add a substation activity in Barrow.

Physiology

Arrangements with the University of Alaska have made possible a project in further study of adaptation of man to cold environments. Electronic equipment is on order and assistants are being trained for investigating skin temperature and other measurements as a means of assessing degree of adaptation through training and repeated exposure to moderately cold temperatures.

Biochemistry and Nutrition

Four papers on the occurrence and etiology of hereditary methemoglobinemia in Alaskan Indians and Eskimos describe notable accomplishments in establishing that this disease is an enzymatic defect. Also developed is a test for the enzymatic deficiency which is a relatively easy and practical laboratory procedure.

Zoonotic Diseases

A review of medical and hospital records shows that a total of 41 cases of cystic hydatid disease and 10 cases of alveolar hydatid disease have been treated or otherwise confirmed in Alaskan aborigines. Twenty-three of the former and seven of the latter have been found in the past three years, indicating a greater awareness of the problem and an increased

effort to diagnose and treat this disease. Through cooperative arrangements with the PHS hospitals in Alaska, all suspects are now given a battery of serologic tests. With CDC assistance a serological test has been worked out which promises to be specific for alveolar hydatid disease.

Radiological Health

Eight summer workers and part-time assistants have been engaged by AHRC under a contract with the AEC Environmental Study Committee in the health and safety survey of the Cape Thompson area where Project Chariot proposes to use nuclear energy to blast a harbor. Dr. Robert Rausch is a member of the Committee which meets quarterly to plan and evaluate these studies.

* * *

Some measure of AHRC activities is afforded in the 39 papers delivered or published and the 19 now in press for calendar year 1959 and first half of 1960; a total of 58 from 18 professional staff.

* * *

AHRC Honors

During the 1959-60 fiscal year, three members of the AHRC staff were accorded recognition. Dr. Irving was elected to honorary membership in the Canadian Physiological Society, and was also appointed a member of the Subcommittee on Biology of the International Institute of Refrigeration. Dr. Robert Rausch was elected Fellow of the American Association for the Advancement of Science. Dr. Francis Fay was elected Fellow of the Arctic Institute of North America.

International

Besides many domestic visitors, AHRC has been host to a number of international visitors this year. Dr. Jarl-Alex Grönroos, University of Turku, Finland, spent several weeks in Alaska gathering information to be used in planning a joint arctic institute for Scandinavia.

The Center gave considerable assistance to a group of 13 scientists from Japan working in Alaska on a project sponsored by Meiji University. Much scientific information and

orientation was given the group, as well as advice and help in making appointments and arranging a schedule for field expeditions. Dr. Masao Oka, Professor of Ethnology, Meiji University, Tokyo, was leader of the project.

Visiting Scientists

We have provided laboratory space and general assistance to one guest worker this year. Several others have worked here for shorter periods during brief visits. Arrangements are being made to provide field-type laboratory space for guest workers through acquisition and remodelling of surplus buildings on a newly acquired plot of 8 lots near the animal farm. These buildings will be served by city water and sewage, a notable advance for facilities in that location.

Several research grantees were assisted in developing projects and in arranging facilities for conduct of Alaskan work. We anticipate increase in this type of activity.

The Interagency Research Advisory Committee, comprised of representatives of the Alaska Native Health Service, the Alaska Department of Health and Welfare, the Alaska Command and AHRC, held 6 meetings and considered 13 project proposals during the year. Those proposing projects involving joint participation of two more of the agencies represented, included a group of local physicians as well as investigators from various universities. Among the latter were the University of Washington, Johns Hopkins, University of Hawaii, University of Wisconsin, Montana State University, University of California, and the Meiji University, Tokyo.

This Committee is useful in coordinating assistance available to investigators of medical and health problems in Alaska. Through its member agencies valuable guidance is given especially to those who work on an expeditionary basis.

Liaison

Under the general heading of liaison much time and effort goes into review and coordination of activities between PHS and State health agencies. The Center's MOC acts as coordinator for the Interagency Steering Committee whose function is to plan, study and recommend on public health problems and services within the mutual interests of PHS

and the Alaska Division of Health. The PH Representative assigned to liaison provides staff work for the Committee.

Consultation

Requests for advice, assistance and consultation range over almost all areas of health included within the Center's investigative program. The Entomology Section is still the only source for scientific information regarding Alaskan biting diptera and control measures. Air pollution control, rabies epidemiology and control, epidemic investigations, resource material and consultants for conferences on nutrition, aging, and respiratory diseases, and diseases of animals, biochemical clinical procedures and a host of such topics make up the calls upon our staff for assistance. We consider it a real privilege to offer this help in an area where many of the specialized skills represented at AHRC are scarce indeed.

Library Service

As usual, the AHRC library has been extremely active in securing and making available reference material in a variety of subjects. The AHRC Publications list is currently being distributed to 225 individuals and institutions within and outside Alaska. Fifty copies have been mailed to "subscribers" in foreign countries, including Australia, Canada, Czechoslovakia, Denmark, England, Finland, France, Ghana, Greenland, India, Japan, Jugoslavia, Mexico, New Zealand, Philippines, Norway, Scotland and Sweden.

Nearly 2,000 circulation loans were made during the past fiscal year. The library filled 820 requests for AHRC reprints over and above the requests filled by individual staff members. An average of 10 letter and phone inquiries per day were received and answered.

General

Management and services have improved by the training of the fiscal clerk in budget analysis, status of funds reports and other fiscal planning and analysis functions which have been of great assistance. The library has begun a project to improve cataloguing, preservation and use of photographic records of work activities. The fire and safety record of the Center is an excellent one and has been improved by instituting important safety measures.

II. RESEARCH PROGRAM

ENTOMOLOGY

1. Mosquito allergy studies

In accordance with prior arrangements, thousands of Aedes communis and punctor larvae were collected, reared, sorted to sex, prepared and shipped to the Kaiser Foundation Laboratory in San Francisco for screen-testing allergic reactions to their abstracts. The plan had been to test allergic responses on mice and possibly on human beings (prison volunteers). Subsequent changes in plans led to the substitution of fleas for mosquitoes, so AHRC collecting activities were cancelled.

2. In the process of collecting the larvae for the proposed allergy studies, some of the sites studied in 1950 were partially resurveyed with interesting results. The resurveys showed a marked reduction in larval breeding in those areas where settlement has occurred. Although the same four species, Aedes communis, punctor, Culiseta inpatiens, alaskaensis, were most prevalent in 1959 as in 1950, the first three have disappeared from many larval habitats. It is suspected that disturbance of habitats such as occurs in settlement discourages oviposition, although the residual effect of spraying cannot be discounted.

3. Biting snipe flies, Symphoromyia

Smoky-winged males have been taken in association with S. atripes females in the Girdwood area, south of Anchorage. As a result of these observations and the absence of S. kincaidi females north of southeastern Alaska, it is now believed, contrary to previous reports, that kincaidi does not occur in western Alaska. The eggs of S. atripes are now known.

4. Black flies

Prosimulium frohnei and travisi have been taken biting humans in the field as well as in the laboratory. This brings the number of black flies which are human biters to 10 or 11. Male swarms have been observed for some species of Prosimulium. Several species of Prosimulium

have produced mature eggs in captivity, but only when blood meals have been available. The number of eggs developed increases with the number of blood meals.

A new system of terminology has been developed for species differentiation based on characters of discriminative value found in the pupal respiratory organ. A simple scheme for diagramming these organs has been devised which aids in quick detection of differences between species as well as in discussing them.

EPIDEMIOLOGY

1. Tuberculosis.

The Epidemiology Section has continued to work with the Tuberculosis Program, Division of Special Health Services, in the study of the prophylactic effectiveness of isoniazid (INH) against tuberculosis. Three villages on Nelson Island (Tanunuk, Newtok and Nightmute) were started on INH in October and will continue prophylaxis until October 1960. A variable INH dosage prophylaxis study was again initiated last fall among entering students at Mt. Edgecumbe High School, Wrangell Institute and Sheldon Jackson Junior College in Southeastern Alaska. The study continued until the end of the school year in May.

By January 1960, all the INH prophylaxis villages, except the three Nelson Island communities, had completed their year of pill-taking. Thus, during the past year the prophylaxis study has shifted into the second phase of activity: disease follow-up. Baseline information on tuberculosis has been transferred to IBM code sheets, and clerical work is now largely concerned with searching the case register, matching records and incorporating information derived through regular case-finding channels.

Supervision of the Ambulatory Chemotherapy Program in villages where the prophylaxis study is in operation has been continued. Chemotherapy was initiated in the three Nelson Island Villages where the new tuberculosis case rate in 1958 was twice as high as the rate in the other chemotherapy villages in the Bethel area.

In spite of the addition of the three Nelson Island communities, the number of persons on chemotherapy in the Bethel area decreased during the fiscal year from 342 to 269, a reduction of 21%. Of even greater significance has been the change in the basis for initiation of chemotherapy during the period the program has been in operation. Table 1 illustrates this change by quarters from 1955 to the present time. The turning point in the program occurred about mid-1956, when approximately 16% of the population of 31 Bethel area villages were receiving chemotherapy. Up to that time the majority of individuals were being put on chemotherapy for medical reasons or while waiting for hospitalization. By the middle of 1957 the majority of individuals were being brought into the chemotherapy program following discharge from the hospital.

Another notable change in the tuberculosis picture in Southwestern Alaska is evidenced in Table 2, which shows the results of tuberculin testing surveys conducted in certain villages during the past year. Comparison of results of these recent surveys with findings of earlier tests shows a remarkable reduction in tuberculosis infection rates in the Bethel area in the last decade. If this change is generally true for the entire state, the bulk of the clinical cases in the future in Alaska as in the rest of the United States, will come largely from individuals infected in past years.

2. Corneal Scarring.

Activity in the study of corneal scarring during the past year has concerned the collection of clinical and epidemiological information on acute eye diseases. Some 70 village visits were made and approximately 500 acute eye diseases were noted. Sixty percent of these acute conditions were classified as definite or probable cases of acute phlyctenulosis.

Detailed information on the socio-economic status of each household was obtained in fifteen villages including such items as degree of crowding, source and amount of income, and characteristics of the household environment.

Results of tuberculin tests obtained in January are being correlated with data on the presence or absence of corneal scarring. Preliminary analysis of results

TABLE I

Basic table: Ambulatory Chemotherapy load by quarter, Bethel triangle, 1955-60

Year	Quarter	At end of quarter				During the quarter								
		Part. vill.	Pop. ¹	Pers. on chemo		Chemo. started			Chemo. stopped				Total persons	
				No.	%	Post hosp. ²	Other ³	Total persons	Compl. ⁴	Hosp. ⁵	Died	Trans. ⁶		
1955	J-M	5	1131	197	17.4	10	205	215	9	9				18
	A-J	8	2430	370	15.2	15	164	179	2	4				6
	J-S	12	2957	546	18.4	16	184	200	6	18				24
	O-D	20	4585	725	15.8	23	197	220	2	39				41
1956	J-M	27	6281	928	14.8	23	226	249	15	31				46
	A-J	31	6833	1084	15.9	52	172	224	21	42	2	3		68
	J-S	32	6956	1081	15.6	49	77	126	74	52	3			129
	O-D	32	6956	982	14.1	40	50	90	120	64	1	4		189
1957	J-M	32	6956	943	13.6	64	74	138	118	57	2			177
	A-J	31	5993	815	13.6	82	68	150	135	38	1	104		278
	J-S	31	5993	823	13.8	68	18	86	32	41	3	2		78
	O-D	31	5993	734	12.3	49	18	67	137	17		2		156
1958	J-M	31	5993	663	11.1	49	26	75	117	24	1	4		146
	A-J	21	4473	420	9.4	59	16	75	154	17	5	142		318
	J-S	23	5202	366	7.0	40	25	65	95	9	2	13		119
	O-D	23	5202	354	6.8	45	26	71	59	7	2	15		83
1959	J-M	24	5428	361	6.7	34	20	54	41	0	2	4		47
	A-J	24	5428	342	6.3	36	12	48	53	9		5		67
	J-S	24	5428	293	5.3	17	20	37	70	8	3	4		85
	O-D	27 ⁷	5978	308	5.1	24	9	33	14	2	1	1		18
1960	J-M	27	5978	299	5.0	20	22	42	29	2	2	18		51
	A-J	27	5978	269	4.9	15	27	42	50	2	3	17		72

¹Population of specified villages as of January 1, 1959.²Persons discharged from hospital and placed on chemotherapy included in this group.³Includes predominantly persons recommended for Ambulatory Chemotherapy by Priority

Table I (Continued)

Board or hospital MOC as a result of usual case finding procedures.

⁴Includes persons in whom progress was sufficiently favorable that Ambulatory Chemotherapy could be discontinued based on judgment of Priority Board and hospital MOC.

⁵Includes persons who were hospitalized at which time Ambulatory Chemotherapy was discontinued.

⁶Includes persons moving out of village or transfer of responsibility to ADH.

⁷Tanunuk, Newtok and Nightmute added.

TABLE 2

Proportion of positive tuberculin reactors
to 5 T. U., PPD (Seibert) by age
in 11 villages (Bethel area) January 1960

<u>Birth year</u>	<u>No. tested</u>	<u>% 6 mm. ind. PPD-S</u>
1958-59	121	0.8
1956-57	143	4.2
1954-55	127	12.6
1952-53	140	47.8
1950-51	130	70.0
1948-49	107	86.8
1946-47	91	96.7
1944-45	124	97.7
1942-43	84	98.7
Total	1067	

shows that nearly 90% of the children with scars are tuberculin positive. In April, children in Hooper Bay and Kwethluk were retested after an interval of a year to determine the time relationship of occurrence of new scarring and tuberculin conversion. Thirteen children in the two villages converted from negative to positive during the year's time. Two of these developed corneal scars within that period.

Another major activity in this study has been the transfer of information on tuberculosis obtained from various sources to punch cards. These data are to be used in the final analyses of the relationship of scarring to tuberculosis infection and disease.

3. Epidemic Investigations

a. Botulism. In collaboration with the Alaska Native Health Service and the Alaska Department of Health and Welfare, the Epidemiology Section investigated, in September 1959, an outbreak of botulism which involved four Hooper Bay residents and resulted in one death. The source of infection was found to be contaminated fluke scavenged from a large species of whale which had been dead an indeterminate length of time prior to ingestion. The organism was identified as Clostridium botulinum by the Alaska Division of Health regional laboratory, and subsequently found to be type E by Dr. C. E. Dolman at the University of British Columbia. Since this outbreak is one of several which have occurred within the last few years and is directly related to the dietary habits of the Eskimos, it is likely that similar outbreaks will occur in the future. Investigations are being initiated in the AHRC bacteriology unit to gain information on the ecology of type E Clostridium botulinum in areas where future outbreaks may be anticipated.

b. Respiratory Outbreak-Barrow. In December 1959, an outbreak of respiratory illness occurred in Barrow. The important feature of this influenza-like outbreak was the high frequency of viral pneumonitis among infants. An estimated fifty percent of the Barrow population was infected and, although there were no deaths, 23 individuals (most of them infants) were hospitalized with pneumonic complications. Specimens were obtained for virus and serologic study, but attempts to isolate the

causative agent have been unsuccessful to date.

4. Epidemic Serology

a. Brucellosis. As a follow-up of the two clinical cases of brucellosis which occurred in Barrow and Wainwright a year ago, serum samples were obtained for antibody screening from Wainwright residents and from 800 National Guardsmen from 57 villages representing all sections of the State but the Southeastern Panhandle. Three individuals from Wainwright in addition to the one Wainwright patient, and 13 of the Guardsmen were found to have brucella agglutinins ranging from 1:20 to 1:320. Ten of the National Guard members are believed to have had previous infections with brucella. Although the number of positive individuals is small, the group represented eight different villages widely dispersed throughout the northern portion of the state, corresponding closely to the distribution of caribou as a major source of food. Since the organism isolated from the two human cases (Brucella suis, Tompsen strain) is considerably different from strains usually associated with human illness, we have little knowledge as to the pathogenicity of the agent and the antibody response to infection. On the basis of the scanty evidence available, it may be hypothesized that clinical cases will occasionally occur in the future and that these cases will arise chiefly among residents of the northern half of the state. It seems probable that the caribou is the major reservoir of infection for man.

b. Q Fever. Because of the apparent increase in Q fever activity among dairy herds in the United States, it was decided that an exploratory study should be undertaken, in cooperation with the Rocky Mountain Laboratory, to determine whether there is Q fever activity among dairy herds in the Matanuska and Tanana Valley areas. The study was initiated in the October-December quarter 1959, and capillary agglutination tests (Luoto) were carried out at monthly intervals on pooled milk samples from some 60 Matanuska Valley herds. Pooled milk samples from Tanana herds were similarly tested on several occasions. Many of the animals comprising Alaskan herds have been imported from areas elsewhere in the Southern 48 States where Q fever is endemic. Thus it was not too surprising to find that

40% of the herds had Q fever antibodies in the milk. Since shedding of antibody parallels the shedding of viable organisms, it is assumed that there is Q fever infection among the herds here. On the basis of the high prevalence of infected herds, it is believed that the infection is spreading among Alaskan herds and is a potential threat to residents of these areas. In order to determine whether bovine infection is "spilling over" into the human population of the Matanuska Valley, Q fever skin tests and serum samples were obtained in three Children's Homes which have their own individual dairy herds. One of these herds has given consistently positive tests for antibodies, the other two have been consistently negative. Skin test reactions among the children at the Home with the Q fever positive herd were found to be significantly more frequent than at the other two Homes. Results of serological tests support these findings (see Table 3). That human infection is occurring is evidenced by the fact that an Indian boy at one of the Homes, who has never been out of Alaska, had both complement fixing antibodies and a positive skin test reaction. The relationship of infection to clinical disease is yet to be determined.

In evaluating the significance of these findings, it was decided to check the specificity of the skin test by testing the adult residents of Hooper Bay, a coastal Eskimo community. As expected, virtually all persons tested were negative and, as elsewhere in the villages, there was no evidence of Q fever complement fixing antibodies.

c. Tularemia. Some interesting and rather surprising information was inadvertently obtained about tularemia in Alaska as a result of checking the specificity of the Q fever and brucellosis tests. At Hooper Bay, a tularemia skin test antigen was used alternately with the Q fever antigen for purposes of comparing and controlling the readings of the Q fever skin tests. Much to our surprise, of 95 adults tested, 16 (17%) showed erythema and induration of 6 mm or greater at 48 hours. Although we had had no previous experience with tularemia skin test antigen, this is a higher prevalence than is generally found elsewhere, even in populations heavily exposed to tularemia. Of interest also is the fact that positive reactions among male residents of Hooper Bay were twice as prevalent as among the females.

TABLE 3

Q fever skin test and CF test results
3 Matanuska Children's Homes, 1959

Children's Home	Number of persons			Total
	Skin test positive*		Skin test and CF neg	
	CF pos**	CF neg		
Q fever negative herds				
L.M.C.H.	1	0	29	30
C.F.H.	0	1	12	13
Q fever positive herd				
V.C.H.	1	3	9	13
Total	2	4	50	56

* ≥ 6 mm. induration at 48 hours.

** $\geq 1:8$ in serum obtained at time of skin test.

Similarly, during the course of checking the specificity of the brucellosis results, a surprisingly high proportion of the Alaska National Guard was also found to have antibodies to tularemia. Consequently, the entire 795 serum samples obtained from the Guard were checked for antibodies. Forty-two of the 55 villages represented had one or more persons with antibody titers ranging from 1:20 to 1:640. The overall prevalence among the 795 men was 18%. Some geographical difference in prevalence was noted, with the highest proportion of those showing antibody titers from Eskimo communities in the Kuskokwim-Yukon deltas (see Table 4).

The full significance of these findings is not known at present. In view of the unexpectedly high prevalence of individuals with antibodies, a most important question concerns the specificity of results. Other than brucella, there are no recognized common pathogens which give heterologous cross in the agglutination test. Several clinical cases of tularemia have been reported by the Alaska Department of Health and Welfare, and a similar high prevalence of antibodies has been noted by Canadian workers among groups in northern Ontario. If the results are specific, then it must be assumed that tularemia is widely distributed in nature in Alaska, and that native groups come into frequent contact with the agent. It follows that an important public health problem will be to determine the relationship of these findings to clinical disease. Pursuant to this objective, our field nurses are collecting epidemiological and clinical histories on Guardsmen from the Bethel area who were found to have antibodies. These data will be compared to similar information collected from a matched control group.

d. Influenza. Sera obtained from Wainwright, Hooper Bay and the National Guard are being tested against various strains of influenza virus in line with efforts to determine the antigenic nature of the virus responsible for the 1918-19 pandemic. No A/swine antibodies were found among Wainwright residents alive at the time of the outbreak; this is consistent with information that the disease did not occur at Wainwright. On the other hand, in Hooper Bay, where the epidemic reputedly had disastrous effects, older adults uniformly showed definite antibodies against A/swine virus. We now have strong evidence that the virus responsible for the disease in Alaska was antigenically similar to A/swine strains.

TABLE 4.

PREVALENCE OF TULAREMIA AGGLUTINATION ANTIBODIES, ANG, APRIL, 1960

Area	No. Villages	Pers. tested	Pers. with agglutination titers of							% Pers. ≥ 20
			20	40	80	160	320	640	Total	
Mainland-North of Yukon Delta	25	389	26	6	5	13	3		53	13.8%
-Yukon Delta and South	24	300	33	12	11	18	3	2	79	26.4%
Off Shore Islands*	6	106	2		2	2	1		7	6.6%
Total	55	795	61	18	18	33	7	2	139	17.5%

*Includes St. Paul, St. Lawrence, Little Diomedes, King Is. and Unalaska. Only Savoonga, St. Lawrence Is. had persons with antibody (7/29).

This evidence should give added support to those who have advocated the need for incorporating A/s.inevirus in influenza vaccines.

5. Arbor Virus Study. In cooperation with the Rocky Mountain Laboratory, the Zoonotic Disease and Epidemiology Sections, AHRC, have undertaken an exploratory study to determine if there is arthropod-borne virus activity in Alaska. Pursuant to this goal, specimens of tissues and sera are being obtained from various migratory birds in the Anchorage, Cape Thompson and St. Lawrence Island areas. Isolation studies will be carried out on the tissues by RML for equine encephalidities and psittacosis. The National Guard and bird sera will likewise be examined for antibodies against these agents. Information will also be sought as to whether mosquito species present in the Anchorage area are avian feeders.

ENVIRONMENTAL SANITATION

1. Water Supply Studies.

F. Y. 1960 marked the first successful winter-long operation of the air lock system, developed over the past few years as a method of preventing freezing of supply lines during intervals between pumping periods. A final report on this project is being prepared. Further modification may be undertaken if solenoid valves and other items of equipment can be located which would eliminate the need for compressed air.

The windmill-driven generator, installed at the well in Tuluksak to provide heat for thawing, functioned successfully through the winter. Failure of the thawing mechanism in mid-March, after the coldest weather was over, was thought to have been caused by a break in the thaw wire rather than in the system itself.

Testing of the $\frac{1}{2}$ -inch asphalt liner was continued through the winter in the experimental reservoir at Goose Lake. Breaks in the asphalt caused by frost heaving and ice damage allowed much of the water to leak out during the testing period, indicating that further tests are needed to obtain a completely satisfactory liner material.

The possibility of utilizing air space between two layers of ice as insulation at the Goose Lake reservoir was also tried out. When the initial surface ice was about 10 inches thick, 6 inches of water were removed from the reservoir and a second layer of ice formed. However, the upper layer of ice collapsed in December, indicating the need for further experimentation to provide better support for the upper ice cover. The possible use of foamed plastic as an insulating upper layer is being investigated.

Analysis of water samples from 25 villages in the Seward Peninsula and Kotzebue areas has been carried out on a quarterly basis. Water from the lagoon adjacent to the PHS hospital at Darrow was also analyzed to determine need for treatment should this source be used to supply the proposed new hospital at Barrow.

Plans for ground water reconnaissance in 15 villages in the lower Kuskokwin area were outlined for execution during F. Y. 1961. This is to be a joint enterprise involving DIH and AHRC. A preliminary survey trip was made to the villages by personnel of the two PHS groups (ANHS and AHRC) in company with a U. S. Geological Survey ground water geologist. Materials for well jetting in the 15 villages were received during the spring preparatory to an early start in July.

2. Waste Disposal Studies.

The sewage stabilization lagoon at Ft. Yukon functioned satisfactorily through the third winter. Intensive sampling and observation during the 1960 spring break up provided valuable data on chemical and biological changes during the transition from anaerobic winter conditions to normal aerobic state in summer.

A second lagoon, serving a roadhouse and trailer court on the Glenn Highway, has begun to function normally. This unit is being observed to determine suitability of this method of waste disposal in subarctic locations where summer daylight hours are not quite as long, and winter and summer temperature ranges are not as extreme as at Ft. Yukon.

The experimental recirculating waste treatment unit installed at the Elmendorf Air Force Base Prison Farm near Anchorage has now operated inoffensively for a period of 18 months without a shutdown for clean up. Four plastic scale models of the unit were constructed to permit laboratory study of biological variables involved in action of the recirculating unit. The scale models are dosed with synthetic sewage.

As far as can be told by observation, experimental privies installed at Kwethluk and Tuluksak have been accepted and well used.

3. Food Sanitation Studies.

First hand observations of local procedures in handling and preparing fish for storage were made in Bethel and several communities in that area during the early spring fishing season. A report on the taxonomic significance of eggs and coricidia of some of the species of fish

tapeworm found in Alaska was compiled and published during the year (See Publications). An inventory of the food fishes and their parasites was also made at Napaskiak and neighboring communities.

4. Housing Studies.

The winter of 1959-60 marked the final period for collection of data on temperature, humidity and fuel consumption in the AHRC experimental houses and in existing native houses for comparison. Analysis of the accumulated data is under way and release of the final report is anticipated during F. Y. 1961.

PHYSIOLOGY

The search for an accurate method of measuring sensitivity in cold tissues has been resolved with the use of falling mercury droplets. A "stimulator" utilizing this method has been developed which delivers drops of mercury of any size from 1 to around 3 mg with accurate volumetric and weight characteristics. Tests using the impact of the falling droplets showed that the threshold for detection of impact depends on the kinetic energy of the falling drop. With this measure, it was found that sensitivity to impact on the finger varied over the hand. At one point it diminished with temperature rather regularly at a rate about 3 times for 10°C. cooling between 35°C. and 20°C. The regularity of results suggests that the method will be useful for exploring the influence of temperature upon sensation, and that it may help in defining adaptation to cold.

Improvements in methods of registering tests of sensitivity have been developed by application of 2-event signals to a Speedomax H temperature recorder. This modification permits registering the time of stimulation and the response elicited as well as temperature of the skin.

A preliminary model of a calorimeter to measure heat output from the human foot has been prepared. This device will permit tests of heat emission and thermal reactions of the foot under various conditions of exposure to cold.

The calorimeter is shaped of plexiglass with baffles to permit motorized stirring. The dimensions have been established so as to permit a change in temperature of

about 2° in 30 minutes. Temperature of the water and at 18 positions on the skin are recorded from thermocouples by digital printing using the Modified Speedomax H temperature recorder described above.

A multiplace digital recorder has been ordered which will permit measurement of temperature at 209 places at one second intervals. The EMF of thermocouples, translated into temperature, is electronically encoded and distributed to a printed digital record. The instrument is used in analysis of thermal reactions and their spatial and temporal distribution over the body during local and general exposure to cold.

During March and April, Dr. Irving participated in an international expedition for study of adaptation to cold among Eskimos at Pangnirtung on Baffin Island in the Canadian Arctic. The group, comprised of 5 Canadian, 2 United States and one Norwegian physiologists, spent six weeks measuring metabolism of the study group during cold nights with insufficient cover. Tests included determination of metabolic and respiratory efficiency during exercise, various aspects of bodily balance of heat during exposure, and of sensory reaction in cold. The Baffin Island expedition is one of a series of comparative studies being carried out by an international group on human races or populations living in cold climates where physiological adaptation might be expected to occur.

Compilation of data obtained during a similar expedition for study of adaptation among Indians at Old Crow, Yukon Territory (1958-59), has been completed and six articles have been prepared for publication.

Dr. Irving participated in the International Congress of Physiological Sciences in Buenos Aires in August 1958, serving as Section Chairman during a preliminary symposium on adaptation to cold. Subsequent to the Congress, Dr. Irving was designated as a member of The Subcommittee on Biology of the International Institute of Refrigeration which has its headquarters in Paris, France.

Studies on the distribution and migratory movement of birds in Alaska have been continued as time permits. Through the interest and cooperation of officials of the Federal Electric Corporation and personnel stationed at outlying points of the White Alice Communications System, a considerable amount of valuable information is being accumulated relative to avian

migration patterns. The numerous and widely spaced simultaneous observations are being applied to define spatial and temporal progress of the great migrations in and out of Alaska each spring and late summer. The general scheme of migrations has shown that vast numbers and species of birds arrive in Alaska over a number of set courses and at fixed time schedules from wintering points in North and South America, from shores across the Pacific Ocean and from the continent of Asia. Knowledge of these migrations is of value in tracing the distribution of avian parasites over remarkably long distances, particularly in relation to the possibility of rapid and long distance dissemination of avian diseases transmissible to man.

A National Science Foundation grant of \$47,100 for a two-year period, 1960-61, was awarded to the University of Alaska for support of a research program to be conducted by Dr. Irving on "Nervous functions in the changing temperatures of peripheral tissues exposed to cold."

BIOCHEMISTRY AND NUTRITION

1. Studies of metabolism.

One of the major developments in the ANRC research program during F. Y. 1960 was the establishment of proof that methemoglobinemia is due to lack of DPNH diaphorase in red cells. Announcement of this proof appeared in Biochemica et Biophysica Acta (See Publications). Familial studies have also shown that methemoglobinemia is a recessive condition, and that heterozygous individuals have about half the normal level of the enzyme in red cells. DPNH diaphorase from normal cells has been purified about 5000-fold and its enzymatic properties studied. The kinetic aspects of purified erythrocyte diaphorase were studied using 2, 6-di-chlorophenolindophenol, cytochrome c and methemoglobin. The conclusions were that the enzyme was rapidly and specifically reduced by dihydrodiphosphopyridine nucleotide, and the enzyme then could reduce any of several substrates at a slower rate. Three additional cases of methemoglobinemia were discovered in the past year in a new group of people--Ingalik Indians of the upper Kuskokwim. A total of 21 cases in 13 families is now known in Alaska.

Metabolic studies in the Biochemistry and Nutrition Section also turned up four cases of alcaptonuria when four

out of four children in a white family in Anchorage were found to have this condition.

Alcaptonuria is a very rare condition caused by an inherited defect of tyrosine metabolism, such that several grams of homogentisic acid are excreted in the urine. The metabolic defect appears to be a lack of the enzyme homogentisic acid oxidase, which prevents the normal metabolism of tyrosine. The condition was first described in 1890, but few instances have been reported in the literature. The inheritance pattern of the condition has never been satisfactorily elucidated, thus the observed occurrence in the local family is of some significance. The situation was brought to the attention of AHRC biochemists by a private physician. The diagnosis was established by isolation of pure homogentisic acid from the urine of one of the children. The crystalline material was identified by melting point and neutral equivalent.

2. Nutrition Studies.

Transfer of food intake data from family food records (covering 10 villages) to individual data sheets is nearly complete. The final set of dietary records will be collected at Shungak, Noatak and Allakaket during early F. Y. 1961. It is anticipated that transfer of all data and preparation of the master and index cards for IBM processing will be completed within the next six to eight months.

Some 96 foods used by Alaskan Eskimos and Indians have been analyzed for moisture, protein, fat, carbohydrate, calcium, phosphorus, iron, thiamine, riboflavin and niacin. Where satisfactory techniques can be employed, many of these foods have also been analyzed for ascorbic acid. The analyses were carried out jointly by the Army Nutrition Laboratory in Denver and the biochemistry laboratory at AHRC. In addition, the important marine and animal fats used in Indian and Eskimo diets have been analyzed to determine the degree and kind of unsaturated fatty acids by Dr. Frank Holman, biochemist of the Hormel Institute.

Data on hemoglobin and cholesterol levels of individuals included in the dietary survey have been collected. During field visits for AHRC projects, personnel of the Biochemistry and Nutrition Section have also collected materials for studies being carried on elsewhere by a variety of

research workers, including for example,

a. Collection of 24-hour urine specimens for sodium excretion tests for Dr. Lewis K. Dahl, Medical Director of Brookhaven National Laboratory on Long Island.

b. Collection of vast quantities of the plant Artemisia tilesii for Dr. Werner Herz of Florida State University who, under an HEW grant, is testing the material for possible presence of medicinal constituents.

c. Collection of native food specimens for study of presence of DDT by Communicable Disease Center at Wenatchee, Washington.

d. Collection of food specimens for study of presence of Strontium 90 by Dr. A. R. Schubert of the Lamont Geological Observatory (AEC grant).

ZOOBOTIC DISEASE

1. Echinococcus studies.

The most significant developments in connection with these studies included the diagnosis of two additional advanced cases of alveolar hydatid disease, with liver involvement, in 2 patients at the PHS hospital in Anchorage. Both patients have undergone apparently successful surgery. Discovery of these two brings the total number of known human cases of the alveolar form of hydatid disease in Alaska to 10.

Several other possible cases are under investigation. Three of these suspects were found during an initial survey in which 101 sera were examined using the hemagglutination test. Most of these sera came from Pt. Hope and Kotzebue, but the survey is being extended to other endemic areas.

A new distribution record of E. multilocularis in Alaska was established during the past year when the parasite was found in an arctic fox from Wales, a new mainland location for alveolar hydatid disease.

Arrangements have been made to conduct routine skin testing at the PHS Anchorage Hospital on all patients suspected of having cystic hydatid disease. Through the cooperation of the Communicable Disease Center, AHRC now has available some fractions of E. granulosus larvae which may have antigenic value. Because skin tests have not, in our past experience in Alaska, given reliable results, the availability of new testing materials makes this study an important one, with the possibility of finding another aid in the diagnosis of hydatid disease.

2. Rabies.

A laboratory study on the characterization of rabies virus obtained from an arctic fox from St. Lawrence Island was initiated in June as part of the study of the natural history of rabies in Alaska. Fifteen arctic foxes were inoculated intra-muscularly in the laboratory with different concentrations of virus suspension from the St. Lawrence Island animal, and the course of the disease is being closely followed. All personnel of the Zoonotic Disease Section have received periodic injections of rabies vaccine in preparation for this study.

Twenty-nine specimens from possibly rabid animals were sent to CDC during the year; all except one were negative for rabies virus. The one positive specimen was from a dog from St. Lawrence Island. Rabies virus was found in 16 (18%) of 89 fox carcasses selected at random from among those obtained by St. Lawrence Island trappers during their winter's hunting. Rabies was not a recognized problem on the island during the past winter and none of the inhabitants reported rabies among the foxes they had observed. It appears that animals whose brains contain virus may be found at any time during the winter, even though clinically rabid animals have not been evident.

3. Trichinosis.

Considerable epidemiological data have been collected on the natural occurrence of trichinosis in microtine rodents on St. Lawrence Island, and the study of laboratory infections is near completion.

The unaccountable loss of two dogs which had been exposed to Trichinella spiralis on St. Lawrence Island caused a serious set-back in investigations of the epidemiology of trichinosis in marine mammals.

4. General survey of animal-borne diseases.

A helminth, Capillaria hepatica, that may be pathogenic in man was recorded for the first time in Alaska from lemmings on Nunivak Island. Conditions in the more remote villages would seem to be favorable for the transmission of this parasite to man.

Several new records for Alaska of parasites and parasite hosts have been made this past year. These include Dictyocaulus n. sp. (?) from moose, and Filaroides osleri from coyote. The former, occurring in the lungs of moose calves, appears to be pathogenic.

5. Project Chariot.

Personnel of the Zoonotic Disease Section have continued to collaborate in environmental studies being conducted by the Atomic Energy Commission in the Cape Thompson area.

LIBRARY

The attached statistical report covers the routine activities of the Library for the year. However, there are a few points of interest that it would be well to bring out.

The AHRC Publications lists was reorganized for easier use and production. Two hundred twenty-five copies have been mailed out, 50 of these to foreign countries including: Australia, Canada, Czechoslovakia, Denmark, England, Finland, France, Ghana, Greenland, India, Japan, Jugoslavia, Mexico, New Zealand, Philippines, Norway, Scotland, and Sweden.

A complete inventory was taken early in the year. Twenty-nine items previously missing were located, leaving 27 still to be found; a remarkably small number, considering the ten years of library service.

Foreign visitors from Japan, Finland, Denmark and Canada signed the guest book among the total of 143 visitors to the Library.

A larger and greatly improved slide viewer has been in constant use since its purchase.

The most pressing problem confronting the Library is that of rapidly diminishing space. By shifting the books, and moving some of the bound periodicals prior to 1956 to storage, and the addition of a small case, a little room was made, but that is now used up. The storage facilities are so crowded that the next step may have to be the boxing and storing of some material in the warehouse. A drastic program of weeding the collection will help to some extent. The out of date, and revised editions which are now in storage should be disposed of. Periodicals without lasting interest to the Center, i.e. Fortune, Popular Mechanics and items that are available elsewhere in the area, should be discarded.

The reference service has remained average. Five to ten queries are answered every day. Four bibliographies have been compiled and about 10 letters from "outside" requesting information have been answered.

In view of the increase in interlibrary loans, AHRC membership in the Pacific Northwest Bibliographic Inter-

Library Loan Center would be advantageous and result in better service, increased efficiency, and a great saving in time.

Two bindery orders were sent out. Approximately 2,560 periodicals were bound into 226 volumes and 26 books were rebound. We are rapidly catching up on the backlog of unbound material and soon hope to have only the current year to be done each time.

We have been able to fill in some of the missing periodicals through the United States Book Exchange, which we joined a few weeks ago. We are able to draw from them on the credit of the National Library of Medicine, so the only expenses in this connection are for the handling fee and the postage.

LIBRARY

Statistical Report for F. Y. 1959-60

<u>Circulation</u>	<u>59-60</u>	<u>58-59</u>
Loans to Center Personnel	1,652	1,275
Loans outside of Center	<u>240</u>	<u>186</u>
Total	1,892	1,461
<u>Record of Accessions through June 30, 1960.</u>	<u>59-60</u>	<u>Total in Library</u>
Books catalogued	200	6,134
Pamphlets, reprints and microfilms	538	7,955
Slides	2	993
Backlog	<u>194</u>	<u>194</u>
	1,035	16,825
<u>Interlibrary Loans</u>	<u>59-60</u>	<u>58-59</u>
AHRC borrowed	141	20
AHRC loaned	23	5
<u>PUBLICATIONS LIST</u>	<u>59-60</u>	<u>58-59</u>
Mailed out - United States	175	
Foreign Countries	<u>50</u>	
	225	163
<u>Reprints Sent Out</u>		
Requested	820	
Reprints requested by AHRC	51	
Periodicals now received	401	

AHRC PUBLICATIONS F.Y. 1960

EPIDEMIOLOGY

1. R. N. Philip, W. T. Weeks, K. R. Reinhard, D. B. Lackman and C. French. Observations on Asian influenza on two Alaskan islands. Pub. Health Rep. 74:737-745, 1959.
2. D. Lackman, R. Gerloff and R. N. Philip. Comparison of complement-fixation and metabolism inhibition as methods of evaluating poliomyelitis antibody response. Am. Jour. of Pub. Health 49:1640-1645, December 1959.
3. Karl R. Reinhard and Harry V. Gibson. Comparative reported incidence of clinical poliomyelitis Alaskan native and non-native residents, 1950-1954. Presented at 10th Alaskan Science Conference. Juneau, Alaska. September 1959.
4. Karl R. Reinhard and Robert K. Gerloff. A study of naturally acquired antibodies against polioviruses occurring among residents of two Bering Sea communities. Presented at 10th Alaskan Science Conference. Juneau, Alaska. September 1959.

ENVIRONMENTAL SANITATION

1. James A. Anderegg, C. F. Walters. Sewage lagoons in Alaska. Presented at 10th Alaskan Science Conference. Juneau, Alaska. September 1959.
2. James A. Anderegg, G. L. Hubbs and E. R. Eaton. Ice-free intermittent pumping of surface water supplies. Presented at 10th Alaskan Science Conference. Juneau, Alaska. September 1959.
3. Douglas K. Hilliard. The taxonomic significance of eggs and coricidia of some diphylobothriid cestodes. To be published in J. Parasit.
4. Berit Asmund and Douglas K. Hilliard. Electron microscope observations on Mallomonas and Synura from Alaska. Submitted for publication in Hydrobiologia, The Hague, Netherlands.

PHYSIOLOGY

1. Laurence Irving. Human adaptation to cold. *Nature*, 185 (4713):572-574. February 1960.
2. Laurence Irving. The birds of Anaktuvuk Pass, Kobuk and Old Crow. U. S. National Museum Bulletin No. 217. Smithsonian Institution. 1960.
3. K. L. Andersen, Bolstad Atle, Yngve Løyning, and Laurence Irving. Physical fitness of arctic Indians. To be published in *J. Appl. Physiol.*
4. Laurence Irving. On the migration of Lapland Longspurs to Canada. To be published in *Canadian Field Naturalist.*
5. Laurence Irving. Nutritional condition of Pipits (Anthus Spinoletta) on arctic nesting grounds. To be published in *The Condor.*
6. Laurence Irving, Kristian Lange Anderson, Yngve Løyning, John D. Nelms, Leonard J. Peyton, and Robert D. Whaley. Metabolism and temperature of arctic Indian men during a cold night. To be published in the *J. Appl. Physiol.*
7. Laurence Irving. Examples of human adaptation to cold. To be published in *J. Appl. Phys.*

BIOCHEMISTRY AND NUTRITION

1. E. M. Scott. The Alaskan nutrition survey of the Inter-departmental Committee on Nutrition for National Defense. Biochemical Findings. Presented at the 10th Alaskan Science Conference. Juneau, Alaska. September 1959.
2. E. M. Scott and Isabelle V. Griffith. Etiology of hereditary methemoglobinemia. Presented at the 10th Alaskan Science Conference. Juneau, Alaska. September 1959.
3. E. M. Scott and I. V. Griffith. The enzymatic defect of hereditary methemoglobinemia: Diaphorase. *Biochem. Biophys. Acta*, 34:584-586, 1959.

4. E. M. Scott. The relation of diaphorase of human erythrocytes to inheritance of methemoglobinemia. To be published in J. Clin. Invest.

ENTOMOLOGY

1. W. C. Frohne. Observations on Alaskan snipe-fly pests (Symphoromyia: Rhagionidae). Mosq. News 19 (3): 172-178. September 1959.
2. W. C. Frohne. A coordinated program of mosquito control for Alaskan communities. Amer. Assoc. Adv. Sci., Alaska Div., 10th Alaskan Science Conference. To be published in Proceedings of the Conference. 1959.
3. K. M. Sommerman. Prosimulium doveri, a new species from Alaska, with keys distinguishing related species (Diptera, Simuliidae). Accepted for publication in Proc. Ent. Soc. Wash.

ZOONOTIC DISEASE

1. R. Rausch and F. S. L. Williamson. Studies on the helminth fauna of Alaska XXXIV, The parasites of wolves, Canis lupus L. J. Parasit. 45:395-403. August 1959.
2. R. Rausch. Studies on the helminth fauna of Alaska XXXV, On identity of certain cestodes (Taeniidae) from foxes. Proc. Helm. Soc. Wash. 26:125-131. July 1959.
3. F. H. Fay and T. J. Cade. The Avifauna of St. Lawrence Island, Alaska. Univ. of Calif. Publications in Zoology, 63(2):73-150. 1959.
4. R. Rausch. Studies on the helminth fauna of Alaska, XXXVI, Parasites of the wolverine, Gulo gulo L., with observations on the biology of Taenia twitchelli. Schwartz, 1924. J. Parasit., 45(5):465-484. October 1959.
5. F. H. Fay. Technique for trapping small tundra mammals in winter. J. Mammal. 41(1):141-142. 1960.

6. B. Kurten and R. Rausch. Biometric comparisons between North American and European mammals. I. A comparison between Alaskan and Fennoscandian wolverine (Gulo gulo Linnaeus). II. A comparison between the northern lynxes of Fennoscandia and Alaska. Acta Arctica, Fasc. X^I. Copenhagen. 45 pp. 1959.